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TIGERPAPER is a quarterly news bulletin dedicated to the exchange of information relating to wildlife and national parks management for the Asia–Pacific region. TIGERPAPER is compiled, edited and distributed by J. Naewboonnien. Financial assistance is partially provided by UNEP.

TIGERPAPER
FAO Regional office for Asia and the Pacific
Maliwan Mansion, Phra Atit Road
Bangkok 2, Thailand

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Front cover: **Spotted eagle** *(Photo:* Ralush Bedi*)*

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EDITORIAL

With this, our first issue for 1981, we would like to extend to all our readers our best wishes for a peaceful and happy year.

TIGERPAPER has steadily increased its circulation over the past few years and presently reaches some 2,700 readers. In order to successfully continue its aim to serve as an information exchange throughout the Asia–Pacific region, we need your help to supply us with information about wildlife and national park management in your own area.

It is not necessary that they be lengthy articles either; a short note about new programs and developments, useful management techniques that could be shared with others working in similar fields in other countries, up–coming meetings and symposiums, are as much welcome as the longer articles.

We would also like to introduce a special section which focuses on a particular subject in each issue which will stimulate discussion. For example, as a logical progression from the International Consultation on wildlife Resources for Rural Development held in Hyderabad, India in July 1980, which was reported on in the Special Issue of **TIGERPAPER**, Vol. VII: No. 3, we would like to request some articles on "the food aspects of wildlife".

In this present age of rapid population growth and fast disappearing natural resources, there is a sizable portion of the world's population whose basic needs for food have yet to be met. Emphasis should therefore be not only on sound environmental policies and rational utilization of existing resources, but also on creating additional potential for the specific purpose of meeting the food needs of rural people.

Now is the time for conservationists and wildlife planners to initiate proper studies as to which species would be most suitable and more importantly, acceptable to the rural populations who are involved. Decisions of this kind cannot be made without consulting the affected parties.

We would like to know what kind of ideas our readers have on this subject and invite your contributions.

J.N.

ON THE ECOLOGY AND CONSERVATION OF THE DUGONG, *DUGONG DUGON* (MULLER, 1776) IN SRI LANKA

by Charles Santiapillai, Ph.D.

Introduction

The Dugong is a marine herbivorous mammal belonging to the Order Sirenia which also includes the manatee *(Trichechus)* and the Steller's sea–cow *(Hydrodamalis)* which is extinct now. The Steller's sea–cow of the Bering Sea, named after its discoverer, the German naturalist Georg Steller, during the Russian Expedition in 1741, was completely exterminated by the end of the 18th century, just 30 years after its discovery, through irrational slaughter by whalers and sealers for its flesh and oil.

While the manatees are found along the tropical Atlantic shores and rivers, the dugongs are strictly confined to the marine environment in the Indo–Pacific region. The distribution of dugongs extends from the Palau islands, New Hebrides and New Caledonia in the east, to the head of the Red Sea and the coasts of East Africa in the west, extending northwards to the Philippine islands, Bahrain and the Gulf of Aquaba, and to the south as far as Brisbane, Perth and Mozambique (Bertram, 1973). But wherever these harmless mammals exist, there remains an uncertainty regarding their continued survival. Unless some strong conservation policies are adopted to ensure their protection, the sirenians in general and the dugong in particular, would disappear from the face of the earth just like the dodo of Mauritius, the passenger pigeon of North America and the Steller's sea–cow of the Bering Sea.

The dugong was first mentioned in Western literature by Pliny (Walker, 1964). The name "dugong" however was derived from the original Malay word " Duyong ," but in Sri Lanka it is known as *"moodhu oora"* and *"kadal pandi"* among the Sinhala and Tamil communities respectively. Although once abundant along the shallow coastal waters of Sri Lanka, the dugong is certainly very rare here today. It is confined chiefly to the north–western coastal region from Jaffna in the North down to Puttalam in the West. However it is not uncommon to hear reports of these animals being caught at one time or other in places like Trincomalee in the east and Batticaloa in the south–east of Sri Lanka. Dugongs seem to be absent from the extreme south of the island. Their preferred habitat in Sri Lanka seems to be in the region of the Gulf of Mannar where the continental shelf is extensive and the waters are shallow.

Description

The dugong is a large, sluggish and entirely harmless mammal. The adults grow to a length of about 2.5 to 3 m and weigh between 225 and 450 kg (Walker, 1964), although according to Kingdon (1971) they may reach a length of about 2.5 to 4 m and weigh between 360 and 1016 kg. The extinct Steller's sea–cow is reputed to have attained a length of about 7.5 m and weighed about 4,000 kg (Walker, 1964). The body is streamlined to aid in progression under water. The fore–limbs are paddle–shaped flippers while the hind–limbs are absent. The tail–fin is horizontally flattened as in cetaceans. The skin is smooth and attains a thickness of a little more than one inch. The mouth is sub–ventral in position. The upper lip is cleft but not so deeply as it is in manatees. The nostrils are dorsal in position. As these mammals inhabit shallow coastal waters where the visibility may not be great, their eyes are rather small, compared to the size of the body, and are placed laterally. The ear apertures are just two pits on the sides of the head without any external flaps. The skin is very sparsely covered with hair. The front end of the snout carries stiff hairs on either side of the mouth. The skull is quite large but the brain case is small relative to it, the brain being small and almost foetal (Kingdon,

1971). The size of the brain perhaps accounts for the sluggish nature of these mammals. The skull has a downwardly pointed rostrum. There is a pair of upper incisors which are called the tusks in males. They protrude outwards. There are no canines. The molar teeth number 3/3 but up to 6/6 may be present during its life–time.

Food and Feeding Habits

The sea–cow is a purely herbivorous mammal, and according to Kingdon (1971) its past range more or less correlated with the tropical and subtropical distribution of its food plants, the *Potamogetonaceae* and *Hydrocharitaceae*. The extant dugongs feed predominantly on the marine higher plants that grow on the bottom of the shallow seas. They are the only mammals that have the ability to convert the marine higher plants into meat that is palatable to man (Bertram, 1970). Unlike the manatee which can feed on the floating vegetation, the dugong can feed only on plants growing on the bottom, as its mouth is sub–ventral in position. During feeding the animal uses its snout and lips rather than its flippers to dig into the mud and uproot the plants. Its powerful muscular upper–lip is thrown over the plants to pull them out, and later the mud is removed by swishing the plants about before swallowing.

The examination of the stomach contents of one adult dugong that was caught off the shores of Silavatturai in the Gulf of Mannar revealed the presence of *Thalassia hemprichii* and *Halophila ovalis.* The stomach contents of another adult dugong caught off the shores of Jaffna had *Enhalus acroides.* It seems probable that the animal feeds on all these three species of marine plants. The absence of *Enhalus acroides* in the stomach of one animal could be associated with the fact that wherever *Enhalus* sp. grows it tends to suppress the growth of *Halophila* spp. and *Thalassia* spp. According to Anderson and Birtles (1978), the animal can specialize on whichever variety of sea–grass species that is most readily available.

There is some doubt as to whether dugongs feed only on marine higher plants or on others as well. Bertram and Bertram (1973) suggest that sirenians as a whole, are marine mammals dependent on green higher plants, not algae. But Annandale (1905) reports the presence of large amounts of a species of green alga in the stomach of a dugong caught in the Gulf of Mannar. Further evidence of the presence of large amounts of marine algae comes from the report of de Silva (1959). However, Jones (1967), who has reared captive dugongs, suggests that these animals come for feeding to certain shallow

areas where the sea–grass of the genus *Cymodocea* grows in abundance. In captivity, his dugongs were fed on *Cymodocea ciliata* and also, to a lesser extent, on *Cymodocea isoetifolia*. These were the two commonest sea–grasses in the neighbourhood. In addition to these, the dugongs were also observed to feed on *Cymodocea rotundata* and *Cymodocea australis*. In the coastal waters of East Africa, the principal food–plants of the dugongs seem to be *Cymodocea ciliata, Zostera capensis, Halodule uninervis* and species of *Syringodinum* and *Halophila* (Kingdon, 1971).

Fishermen who have caught and killed dugongs off the coastal waters of Sri Lanka say that it is not uncommon to occasionally find stones in the intestines, together with decaying plant debris. The stomach is not a simple sac but consists of a number of compartments whose exact functions are not known. Being herbivores, dugongs have voracious feeding habits. The adults are known to consume 25 to 30 kg (wet weight) of food daily (Kingdon, 1971). The intestine is enormous, almost 20 m long. The condition of the food inside the intestine suggests that very little chewing is being done in the mouth. Cellulose being the chief constituent of their food, the animals may incorporate, in the complex stomach, populations of symbiotic protozoans and bacteria which aid in the digestion of cellulose.

Physiology and Behaviour

The sirenians and cetaceans are the most aquatically adapted of all mammals (Bertram and Bertram, 1973). Being a mammal, the dugong must surface to breathe air. The nostrils are valvular and are situated dorsally on the head. They remain closed when the animal is under water and open briefly (1.5 to 4 seconds) when the animal surfaces (Jones, 1967). According to Anderson and Birtles (1978) the range of time spent by dugongs on the surface waters is between 0.6 and 4 seconds. Fishermen who have observed the dugongs in the coastal waters of Sri Lanka say that the animals surface every 15 to 20 minutes to breathe air. It is not known to what depths they dive. During these dives, the metabolic rate, the blood circulation, the rate of heart beat are all reduced. Dugongs have a large amount of blood and thus could store sufficient oxygen in their haemoglobin.

Dugongs are gregarious animals. Fishermen report seeing the animals moving about in groups of 3 to 5 individuals. Larger groups are rare. While moving about, the animals are known to produce squeaky calls which are ultrasonic and are used mainly in communication rather than for navigation (Kingdon, 1971). The density of dugongs around the coastal waters in Queensland, Australia is about 5 individuals/km according to Anderson and Birtles (1978).

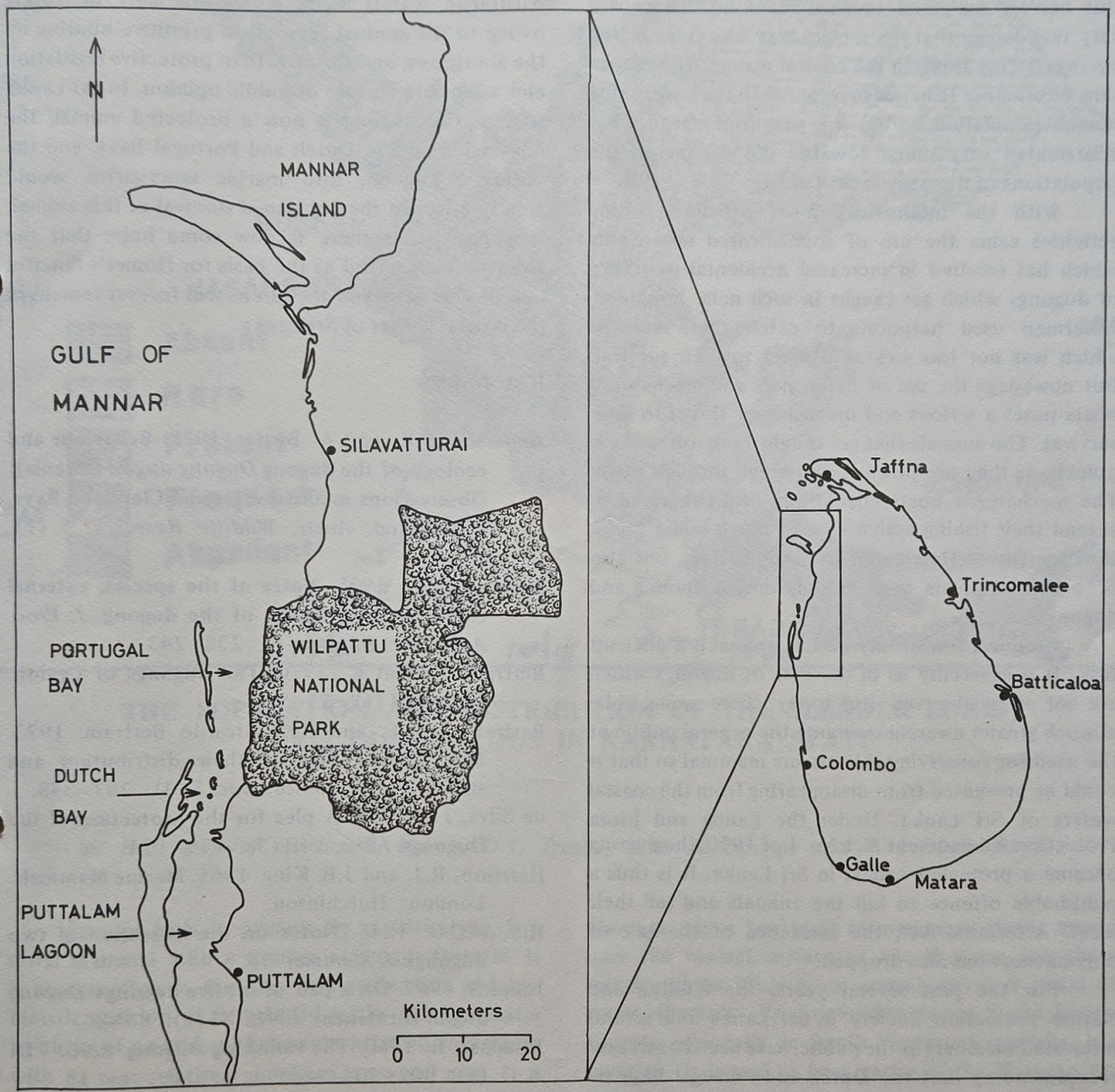
Very little is known about the breeding biology of these mammals. The dugong is a slow breeder. Copulation takes place in the shallow waters during the south–west monsoons in Sri Lanka. The strong winds drive the animals to the calmer waters of the lagoons in the Gulf of Mannar where they mate. During mating, the female rotates so that her ventral surface is uppermost (Anderson and Birtles, 1978). The gestation period according to Kingdon (1971) is between 11 and 12 months. It would appear that in Sri Lanka the young are born throughout the year. But in Australian waters most of the young seem to be born between March and June (Norris, 1960). Sea–cows, cetaceans and hippopotamuses are the only mammals that give birth to their young under water. Usually only one calf is born, although twins are not uncommon. Three fishermen in Sri Lanka reported seeing twin foetuses inside pregnant females that were caught in their nets. The young at the time of birth measure about 1,000 mm in length and weigh 18 kg (Walker, 1964). The calf is held by the mother at her side, horizontally beneath her flippers while swimming, during which time she suckles her young.

The animals are sluggish, ponderous creatures. They are harmless and can be trained easily. Their sense of hearing is acute, although their vision is poor. The brain as in cetaceans has a well developed cerebellum which is associated with balance and orientation (Kingdon, 1971). This feature and other characteristics such as the presence of numerous short thick and heavy bones lacking in marrow, thus resembling foetal bones, may be connected with an inactive thyroid gland (Harrison and King, 1965). This would affect the metabolism and behaviour of the animals.

Conservation

The dugongs are completely defenceless against their enemies such as sharks, sting–rays and, above all, man. Their survival is attributed to their living in places which are not suitable to their predators. Dugongs are affectionate animals. Cases of altruism have been reported by fishermen in Sri Lanka who have seen cows attempting to save the calves by tipping them out of the nets into which both had got caught. Osman Hill (1945) found a small fish inside the prepuce of a male dugong and suggested that this was a case of commensalism.

The most important and ruthless predator of these mammals has been man. Man has hunted them for their meat, oil and hide. In Sri Lanka, there is no organized dugong fishery. Whatever animals are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caught are only incidental to the main fishing efforts of the individual fishermen. However, the meat is so palatable and nutritious, that it is a highly marketable commodity. The meat tastes so much like pork that it is eaten by the Moors for whom pork is forbidden. Silverberg (1967) succinctly describes the sea–cows as floating meat–supplies. If properly conserved and managed, they could undoubtedly be harvested and this harvest sustained to feed mankind. There is a very real danger that the species may be exterminated by overfishing them in the coastal waters. The expansion of offshore fisheries in response to the burgeoning human population within the past four decades has contributed very much towards the decline of the populations of dugongs in Sri Lanka.

With the intensification of offshore fishing activities came the use of sophisticated nylon nets which has resulted in increased accidental mortality of dugongs which get caught in such nets. Long ago, fishermen used harpoons to catch these animals which was not too serious a threat to their survival. But nowadays the use of nylon nets and mechanized boats poses a serious and much bigger threat to their survival. The animals that get caught in nylon nets die quickly as they are powerless to break through them. The mechanized boats enable the local fishermen to extend their fishing activities over much wider areas, thus increasing their catch not only of fish, but also of other mammals such as dolphins, porpoises and dugongs.

Conservation of any marine animal is a difficult task. It is especially so in the case of dugongs which are not often observed. But today, there seems to be a much greater awareness among the general public of the need for conserving this marine mammal so that it could be prevented from disappearing from the coastal waters of Sri Lanka. Under the Fauna and Flora Protection Amendment Act No. 1 of 1970, the dugong became a protected animal in Sri Lanka. It is thus a punishable offence to kill the animals and sell their meat. After this Act, the incidence of the sale of dugong meat has also dropped.

For the past several years, the Wildlife and Nature Protection Society in Sri Lanka and several interested members of the public, have been constantly recommending that the Dutch and Portugal Bays be declared Marine Sanctuaries for the conservation of dugongs. These bays provide ideal conditions for the survival and maintenance of dugongs as long as fishing with big–meshed nets in these waters is kept to a minimum and dynamiting of fish is prohibited. In addition to these two areas, Bertram (1970) recommends the inclusion of the Puttalam Lagoon as a suitable area for conserving dugongs. These marine sanctuaries could well function as extensions of the Wilpattu National Park which forms a refuge for the terrestrial mammals. The use of aquatic corrals built out of non–corrosive material where dugongs could be kept, has been suggested by Jonklaas (1960).

Conservation methods adopted in Australia have already led to the growth of dugong populations in the northern waters of Australia. Bertram and Bertram (1973) report that the number of dugongs in Australian waters seems to be gradually increasing owing to the gradual decrease of primitive hunting by the aborigines, and the growth of protective legislation and a sensible climate of public opinion. In Sri Lanka too, as the dugong is now a protected animal, the conversion of the Dutch and Portugal Bays, and the Puttalam Lagoon, into marine sanctuaries, would greatly enhance the continued survival of this animal. It appears that there is now some hope that the animal which served as the basis for Homer's fanciful tale of Odysseus and the Sirens will forever remain in the coastal waters of Sri Lanka.

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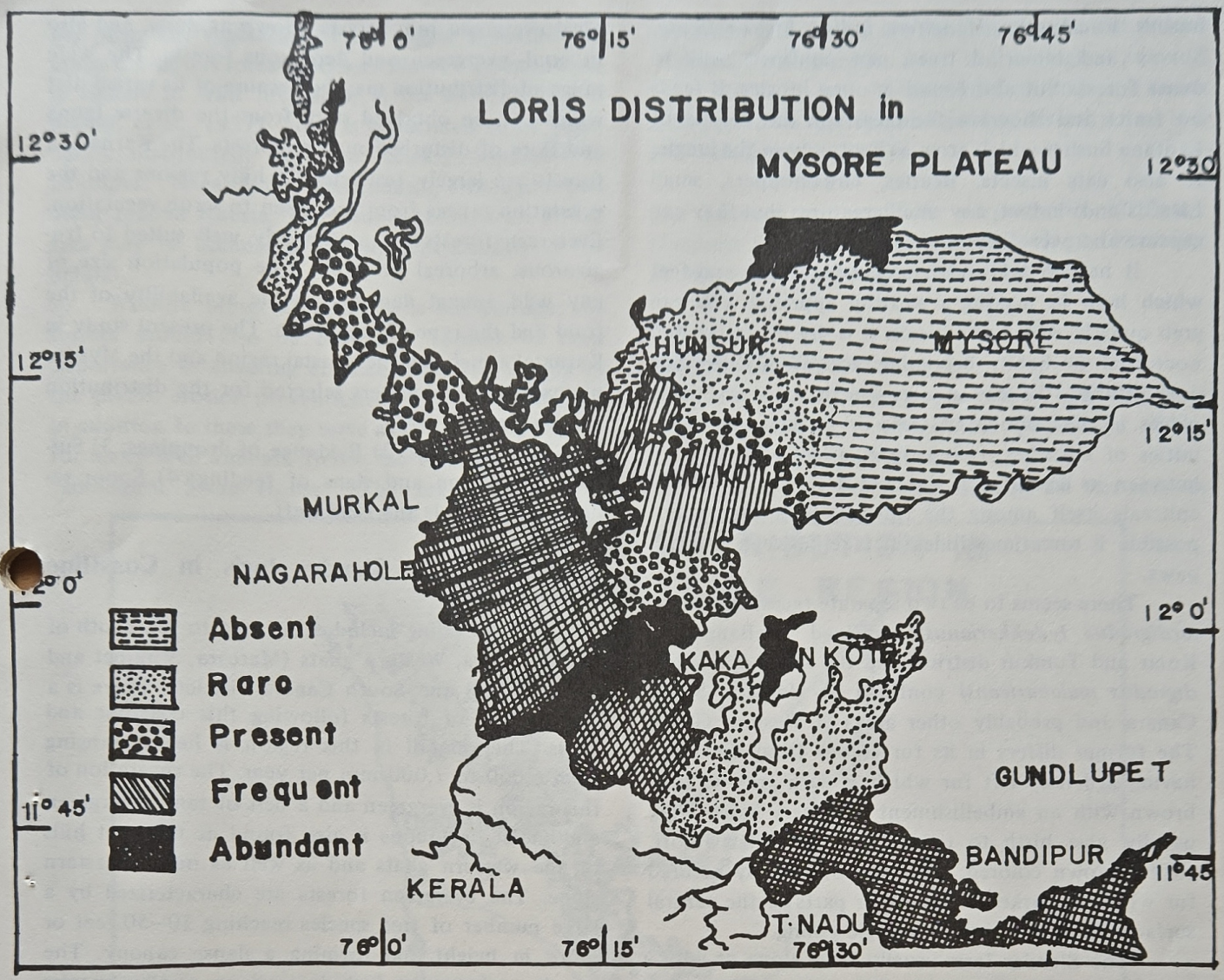

THE POPULATION AND DISTRIBUTION OF THE SLENDER LORIS *LORIS TARDIGRADUS* IN KARNATAKA STATE

by H.B. Devaraj Sarkar, S. Murali, D.T. Prasad, B.M. Shekarappa and V. Vijayalakshmi

Slender loris, a primate by classification, is a novel mammal with a number of unique features. It is an exception to the rules of classification and systematic position. It is included in the order primates by virtue of a number of characteristics which it shares with its near relatives: monkeys, apes and man. It is grouped with these animals which are said to have reached the climax of mammalian evolution. Still, the Slender loris shows some primitive non–primate characters. All primates are characterised by the occurrence of a menstrual cycle, the presence of a discoidal hemochorial type of placenta during development and a single thoracic pair of mammary glands. But the Slender loris. exhibits an oestrus cycle as all other eutherian mammals, epitheliochorial type of placenta and a few pairs of mammary glands spread over the ventral surface of the thoracic and abdominal regions. This is an animal which is afraid of water, therefore its distribution in the South Indian Forests, especially in South Western Karnataka, is a mystery. It is said to be a native of the Malayan Archipelago and how this animal migrated to the South Indian Peninsula is beyond interpretation. Still, an explanation is offered that this animal provides the clue that the Malayan Archipelago at one time formed a continuous land mass with South India and it must have spread to South India then. After this event the two land masses separated, leaving the mystic clue of the distribution of this animal.

The Slender loris usually lives in Bamboo

bushes, Eucalyptus, *Mangifera indica, Ficus religosa,* Survey and tamarind trees, not confined only to dense forests but also found in open jungles. It feeds on fruits and shows a fondness for the berries of Lantana bushes which grow so profusely in the jungle. It also eats insects, Beetles, Grasshoppers, small Lizards and, in fact, any small creatures that they can capture and overcome.

It has no tail and has clasping hands and feet which help in making a stealthy approach and can grab quickly with both hands. It is shy by nature and nocturnal in habit, becoming active only towards dusk. During the day it sleeps in shady, inaccessible places in the hollows of trees or in the leafy extremities of branches, rolled up in a ball with its head between its legs. If it is watched it crawls slowly and conceals itself among the leaves, and if that is not possible it sometimes hides its face between its forepaws.

There seems to be two separate races, one *(Loris tardigradus lydekkerianus)* confined to Bangalore, Kolar and Tumkur districts and the other *(Loris tardigradus malabaricans)* confined to Mercara, South Canara and probably other areas of Western Ghats. The former differs in its fur colour from the latter having a dense, soft fur which is dark grey to light brown with an embellishment of silvery hairs. They usually give birth to twins. The latter has a soft, earthy brown colored, less dense and wooly natured fur which is darker in the lower parts of the ventral surface. They give birth to a single young.

The Slender loris usually lives alone or with a mate and rarely in groups. They also exhibit territoriality or have a home range (Ilse 1955). The observations on breeding habits show that it exhibits two oestrus periods in a year and breeds twice a year (Rao 1927; Nicholls 1939; Hill 1953; Ramaswamy and Kumar 1962). The gestation period lasts five to six months (Nicholls 1939; Manley 1966a; 1966b; 1967 and Rao 1927). The number of litters differ from race to race as mentioned earlier.

The population and distribution study of Slender loris in Karnataka State was extensively carried out in the major forests of Karnataka. The above study was undertaken in Karnataka because of its dwindling numbers and the threat of extinction. Along with the Leopard, Rhinoceros Asiatic lion, and Lion–tailed Monkey, the Slender loris is also one of the India's most endangered legally protected species. The eyes of the Slender loris are believed to be a potent love charm and also to be of medicinal importance in the treatment of eyes. Because of these superstitions these animals are being captured and killed indiscriminately. Both races of loris live in the western ghat mountains of South India, in the tropical evergreen rain forests known as shola, and also in semi–evergreen and deciduous forests. The wide range of distribution may be because of its varied diet which can be obtained only from the diverse fauna and flora of disturbed mature forests. The Karnataka forests are largely restricted to hilly regions and the vegetation ranges from evergreen to scrub vegetation. Evergreen forests are particularly well suited to frugivorous, arboreal primates. The population size of any wild animal depends on the availability of the food and the type of vegetation. The present study in Karnataka includes the coastal region and the Mysore plateau. The parameters selected for the distribution studies are:

1) Actual sightings; 2) Evidence of droppings; 3) Suitable vegetation and signs of feeding; 4) Spoor reports from tribals and field staff.

Distribution of Slender loris in Coastline Region

The coastline includes the area to the South of North Canara, Western ghats (Marcara, Virajpet and Somavarapet) and South Canara districts. There is a narrow belt of forests following this coastline and ghats. The rainfall in this region is heavy, ranging from 6,000 to 7,000 mm per year. The vegetation of this region is evergreen and a belt of semi–evergreen and moist deciduous is also found at the foot hills of the western ghats and as well as on the eastern slope. The evergreen forests are characterized by a large number of tree species reaching 30–50 feet or more in height and forming a dense canopy. The woody understories include saplings, smaller species of trees, shrubs and often a tangle of cane or bamboo –like reeds. The ghat forests are not uniform. The highly variable terrain includes steep hillsides topped with rocky precipices, reached by sharply ascending slopes. The important plantation crops of this area are coffee, tea, tobacco, rubber cardamom, areca, cocoa, cashew and banana. In general the loris is thickly distributed in these areas except for a few places. The reason for this wide range of distribution may be the varied food habitat, deforestation and human interference. Although they feed on fruits and small insects they utilize every stratum of the forest.

Distribution of Loris in Mysore Plateau

The Mysore plateau encircles the southern most ranges of Sahyadri proper, Niligiris and the Eastern spur of the hills towards Biligirirangana hills. The noteworthy forest areas that come under this plateau are Nagarahole, Bandipur (world famous wild life sanctuaries), Anekadu and Thittimathi forests which are considered to be the reserve forest areas of the state. This plateau enjoys a rainfall of 600 – 1,000 mm

per year. The vegetation of this region is covered by moist deciduous forests. Mysore plateau is undoubtedly richest in wild life fauna in the state (Narendra prasad, el al., 1977). Loris is considered to be abundantly distributed. They are thickly populated in Bandipur, Nagarahole, Thittimathi, Anekadu and other reserve forests. The abundance of loris in this area may be because of the eminent stability of the habitat.

Wildlife preservation alone is not enough; the forests should also be protected because of their importance in ensuring an adequate water supply to the plains, erosion prevention, tourism potential and in addition to these they serve as the breeding ground for many wild animals. Hence the forest is called the "Biological Store House". The luxurious tropical evergreen rain forests are the richest and most diverse biological communities from the ecological point of view. Hence it may be stressed that flora and fauna have served as reservoirs of genetic diversity and loci for evolutionary activity.

The authors are with the Department of Post–Graduate Studies and Research in Zoology, University of Mysore, Manasgangotri, Mysore – 6.

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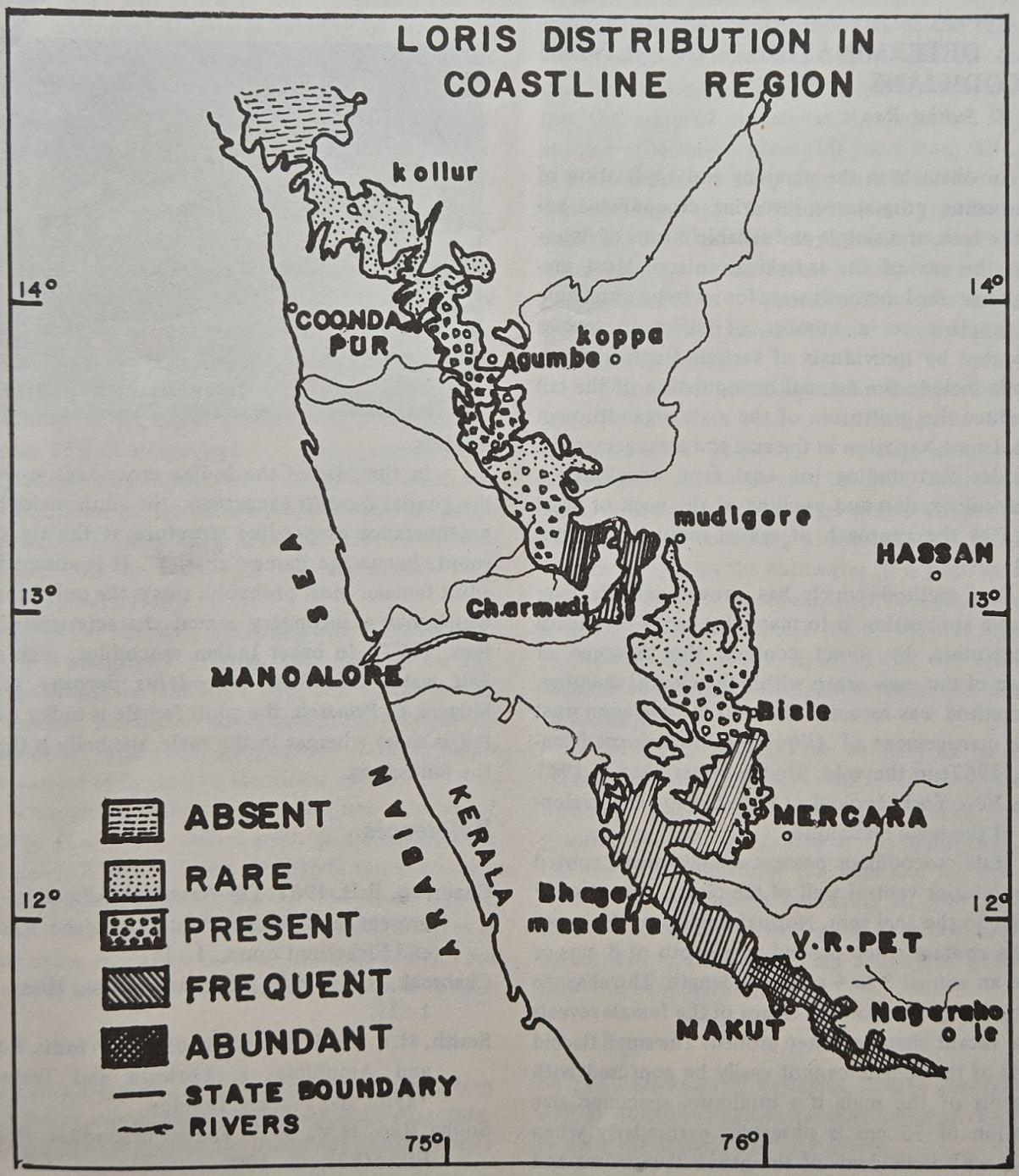

young male loris, Loris tardigradus lydekkerianus, kept in captivity in Poona. *British Journal of Animal Behaviour* 3: 188–120.

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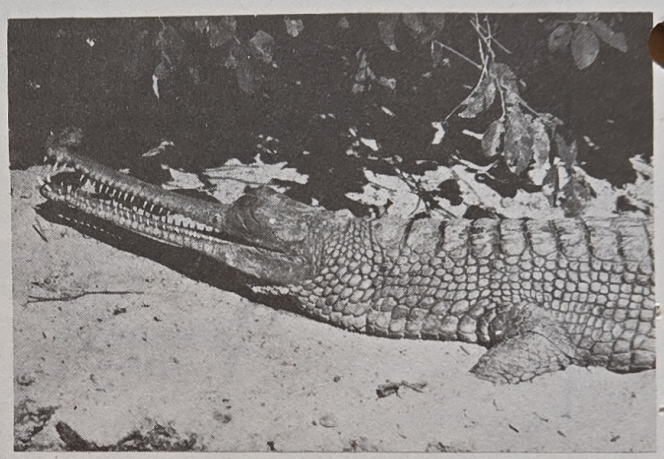
SEX DETERMINATION IN LIVING CROCODILIANS

by M.V. Subba Rao

An obstacle in the planning and application of any breeding programme involving crocodilians has been the lack of a simple and reliable means of determining the sex of the individual animal. Most previously described methods were found to be unreliable when applied to a number of different species represented by individuals of various lengths. These methods include the manual manipulation of the tail to produce the protrusion of the male organ through the anal vent, variation in the size and arrangement of the scales surrounding the anal vent, vocalization, general colouration and swelling of the neck or nasal regions at the approach of sexual maturity (Smith, 1931).

One method which has proved reliable over extensive application is to manually probe the cloaca to determine, by direct contact, the presence or absence of the male organ within the cloacal chamber. This method was recently reported to have been used in the management of *Alligator mississipiensis* (Chabreck, 1967) in the wild. Studies undertaken in 1961 at the New York Zoological Park led to the development of the same technique.

Male crocodilians possess a single organ, rooted to the interior ventral wall of the cloaca immediately anterior to the anal vent. Normal rigidity of the organ permits contact when probed at a depth of 8 cms or less in an animal 3 to 4 meters in length. The absence of a rigid organ within the cloaca of the female reveals only a vacant chamber when probed. The small flaccid clitoris of the female cannot easily be confused with the penis of the male if a minimum specimen size limitation of 75 cm is observed, particularly when dealing with individuals of the genus *Tomistoma* and



Gavialis.

In the case of the Indian crocodiles, especially the gharial *Gavialis gangeticus,* the adult males have a protuberance or pot-like structure at the tip of the snout, hence the name "gharial". It is absent in the adult female. Most probably, this is the only crocodile which has a secondary sexual characteristic (Subba Rao, 1977). In other Indian crocodiles, such as the Salt water crocodile, *Crocodylus porosus* and the Mugger, *C. Palustris,* the adult female is bulky and the tail is short whereas in the male, the belly is thin and the tail is long.

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INSTANT FOSSILS

by Torben B. Larsen

Tigerpaper is very properly mainly concerned with the protection of the larger mammals and with habitat conservation. The latter appears the more important since this is where the threatened loss of currently unknown genetic material is so much the greater. However, as **Tigerpaper** has frequently pointed out, even on the most optimistic assumptions much of the tropical ecosystem is doomed to extinction. And this brings me to my point, the urgent need to secure adequate series of invertebrate animals from as many localities as possible.

Someone said that every insect on a pin, accompanied by an adequate locality label, is an instant fossil. Tragically this is all but true. Tropical habitats in their natural state are disappearing before the total fauna has been studied. I personally specialise in butterflies *(Rhopalocera)* which is probably the best known of all insect groups. Yet, a fair guess is that only 85% of all species have yet been scientifically described. Among moths *(Heterocera)* it is much less than that. And as far as beetles *(Coleoptera)*, wasps *(Hymenoptera)* and flies *(Diptera)* are concerned, are 40%, 60% or even 80% still unknown? Your guess is as good as mine.

If we do not start collecting invertebrates now, and quite intensively at that, one thing is certain. They never will be collected. They will succumb with their habitat, leaving no trace, except for holes in the phylogenetic and zoo–geographic record. Holes which cannot even then be identified as such.

I caught a rather spectacular new species of butterfly (*Euriphene kiki* Larsen & Bernardi) in a small patch of relict forest in Nigeria ten years ago. Only the single specimen is known. The forest is gone. And the butterfly? Who knows? Maybe it survives in neighbouring areas, but no–one has collected it. I am glad that at least the type specimen survives in Paris.

So when we plan to conserve at least part of the natural environment, that is not enough. We must also plan to preserve the record of what will inevitably be lost. It is essential that intelligent and intensive general collecting of invertebrates should take place. All countries should prepared to allocate funds to care for such collections. It is quite sufficient to sort out the material crudely at the moment. It can be studied at leisure – even 100 years from now. But if it is not collected now, it never will be studied, for it will no longer exist in nature when its habitat is gone. And only if we know to–day's baseline can we measure what happens in the future. Instant fossil is not an exaggerated term – provided that the specimen is well labelled, well conserved, and eventually placed in a public repository.

There are some legislative implications in the concept of instant fossils. National parks have been created, where collecting is totally prohibited and where dispensation cannot be given. Some countries have, or are considering, laws which will prohibit the export and/or collecting of insects. That is throwing out the baby with the bathwater. It is possible to take insects in literally hundreds of thousands out of even a small patch of tropical forest without making a permanent dent in the dynamics of the ecosystem. None can be taken out when forest has been converted to lalang grass.

So let us protect the habitat, let us protect species in actual danger (such as New Guinea's Birdwing Butterflies), and let us make codes of practice for collecting. But at the same time, bring out the nets, the traps, the pins and the test tubes. Encourage responsible collecting so that we can at least preserve the record of that which cannot be saved. The scientist working a hundred years from now will be grateful indeed.

Torben B. Larsen is Assistant Director of Evaluation in the International Planned Parenthood Federation. He is an amateur entomologist and has written books on the butterflies of Lebanon, Jordan and Oman, as well as numerous papers. He has collected extensively in Asia, the Middle East and Africa.

THE NON–HUMAN PRIMATES OF BANGLADESH

by Mohammad Ali Reza Khan

Introduction

The non–human primates (Order Primates, Class Mammalia) are used all over the world for biomedical, biological and military researches. The world is almost entirely dependent on the supply of these animals from the under–developed countries of Asia, Africa and Latin America. In the recent past most countries of the world have stopped exporting non–human primates. India was the largest supplier who recently put a ban on the export and Bangladesh followed.

There appear to be no faunistic surveys on the non–human primates of Bangladesh except the one by Green (1978) and sporadic reports by Blanford (1891), Ellermann & Morrison–Scott (1951), Mountfort (1969), Prater (1971), Husain (1974), Hendrichs (1975) and Roonwal & Mohnot (1977), which are mostly based on inferences rather than on actual field studies. Green visited some of the forests of Chittagong, Sylhet and Tangail. He sighted only four species of non–human primates and assumed the presence of another four species in Bangladesh.

Between 1970 and 1979 the author carried out extensive field work in most of the forests of Bangladesh, excepting the Sunderbans under Khulna where there is only one species of non–human primate – the Rhesus Macaque. The author and a couple of his students sighted 9 out of 10 species of non–human primates during the last decade. Thus the information presented here is based on actual observation and not on inferences. This brings the knowledge regarding non–human primates to an up–to–date level and gives the present distribution and status of all the species occurring here.

Status and Distribution

Slow Loris *(Nycticebus coucang Boddaert)*

Of all the non–human primates present in Bangladesh the Slow Loris is the only nocturnal, and at the same time, totally arboreal one. It is at present found in the natural forests of the Bangladesh Garo Hills adjoining Jamalpur district and the Indian State of Meghalaya, Sylhet, Chittagong– both Chittagong and Cox's Bazar Forest Divisions, and both North and South Divisions of Chittagong Hill Tracts district.

Slow Loris (Photo: Forest Dept., Sarawak)

Since it is both arboreal and nocturnal it is difficult to spot them with ordinary torches. But if a special type of spotlight is used to scan the tall tree trunks it may be possible to see two dazzling eyes reflecting light. Also, the loris has a high–pitched, shrill voice which may serve as a clue to its location. They are often caught by the tribal teenagers who usually climb up trees in quest of bird eggs, nestlings or for collecting honey and comb. Previous records showed that this loris once occurred in the neighbourhood of Dacca and Rangpur (Blanford 1891) from where it has now been totally exterminated.

Pigtail Macaque *(Macaca nemestrina Linnaeus)*

Green (1978) assumed that it probably occurred in the Chittagong Hill Tracts since it occurs in neighbouring Burma (Fooden 1976). It is one of the rarest non–human primates of our eastern forests. According to the authorities of Bangladesh's only zoo, one

pair of Pigtail Macaque was collected from Chittagong Hill Tracts (North) in the year 1970, which later died in captivity.

Crab–eating or Longtailed Macaque *(Macaca fascicularis Wroughton)*

Rashid (1977) reported its presence in the Chittagong Hill Tracts. It also occurs at Cox's Bazar Forest Division. It is an uncommon species, partial to hilly streams leading to the sea.

Assamese Macaque *(Macaca assamensis Mc Clelland)*

It occurs at Sylhet, Chittagong and Chittagong Hill Tracts Forest Division (North). Earlier records mentioned it for the Sunderbans (Prater 1971) but this has never been confirmed by other authors (Mukherjee & Gupta 1964, Mukherjee 1975). There is one specimen of this species at the Zoological Survey of India, Calcutta, which the author had occasion to examine. The tag on it said that it was collected from the Sunderbans. No such specimen has so far been procured from the same area nor have the workers who did the faunistic survey of the Sunderbans (Mukherjee 1975) come across it. In this work Mukherjee has categorically said that only Rhesus Macaque occurs in the Sunderbans.

Stumptailed Macaque *(Macaca arctoides Geoffroy)*

Green (1978) guessed that it may be present in Bangladesh since it occurs in the neighbouring Burmese forests. During a survey this macaque was found in the Sylhet Forest Division and its presence is certainly confirmed in Bangladesh, although the author did not see it in Chittagong or the Chittagong Hill Tracts Forests Divisions.

Rhesus Macaque *(Macaca mulatta Zimmerman)*

This macaque still has the widest distribution in the country in spite of the fact that it is the most persecuted non–human primate. Of all the populations, the suburban and urban ones have suffered most. It has disappeared from the mango orchards of Chapai Nawabganj and Naogaon under Rajshahi, Chuadanga and Meherpur under Kushtia, Satkhira under Khulna, patchy Sal Forests *(Shorea robusta)* of Dinajpur and Rangpur, open woodlands of Faridpur and Jessore, and denuded forests of Comilla and Noakhali districts during the last decade or so. A few isolated troops or sub–populations still survive in Dacca city, Narayanganj, Dhamari under Dacca, Uzirpur under Bapisal, Madaripur under Faridpur, Chandpur and Matlab under Comilla. The author found them in the foot of the Garo Hills along Jamalpur, the entire Madhupur Tract of Sal Forest lying within Dacca, Mymensingh and Tangail districts, Chittagong, Chittagong Hill Tracts, Cox's Bazar and Sylhet Forest Divisions. Due to trapping pressure their population is fast declining.

Common Langur *(Presbytis entellus Dufresne)*

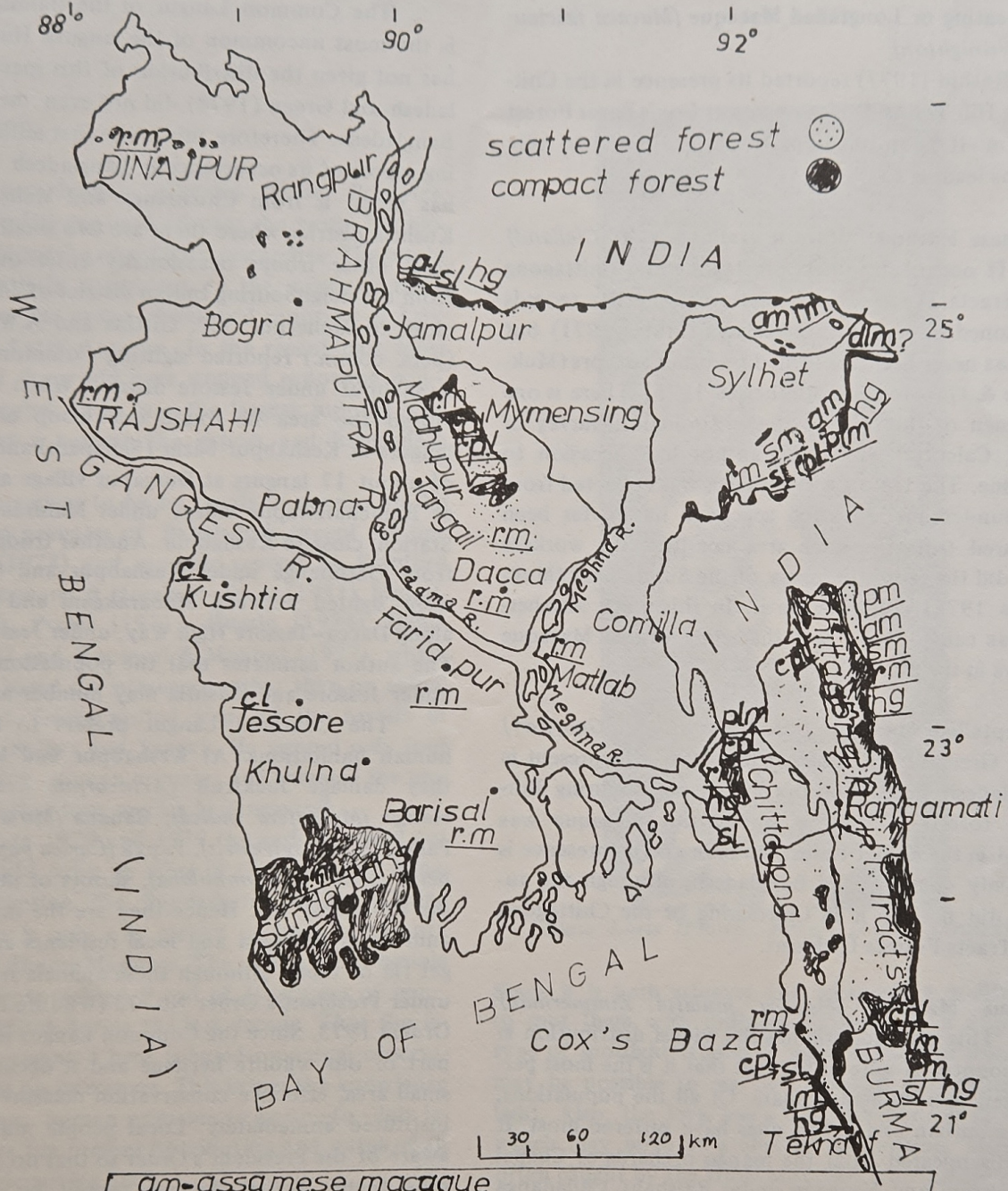
The Common Langur or the Hanuman Langur is the most uncommon of the langurs. Husain (1974) has not given the distribution of this species in Bangladesh and Green (1978) did not even mention it for Bangladesh. Therefore this is the first authentic sighting report of its occurrence in Bangladesh. The author has noted it from Chuadanga and Meherpur under Kushtia district where there are two small troops. Several other troops occasionally enter our territory from the neighbouring Indian district of 24–Parganas, close to Meherpur. S.P. Gittins and A.W. Akoonda (pers. comm.) reported sighting Common Langur at Keshabpur under Jessore district. When this author visited the area he found one troop of about 15 langurs at Keshabpur bazar (Sahapara) and one troop of about 17 langurs at Durgapur village and another at Ramchandrapur village under Manirampur Police Station, close to Keshabpur. Another troop was noted from Garbhanga under Keshabpur and two troops were sighted between Mubarakganj and Jhenaidah, along Dacca–Jessore High Way, under Jessore district. The author estimates that the population of langurs under Jessore and Kushtia may number around 150.

The Common Langur prefers to live within human habitations. At Keshabpur and Manirampur they damage Jackfruit *(Artocarpus heterophylla)*, Mango *(Mangifera indica)*, Banana *(Musa sp.)*, Date Palm *(Phonix sylvestris)*, Papya *(Carica papya)*, Blackberry *(Syzygium jambulana)*, shoots of jute *(Corchorus capsularis)* etc. Hence they are the most disliked animals of the area and local residents are trying to get rid of them, although these animals are protected under President's Order No. 23 (Wildlife Preservation Order) 1973. Since the Common Langur is an integral part of our wildlife heritage and it occurs in such a small area, effective conservation measures should be instituted immediately. Local people must be made aware of the President's Order so that no one traps or kills them. Actual damage caused by each troop should be determined and, if possible, compensation be given to the farmers. Also, the Government Forest Department should immediately post a forest guard there or and honorary wildlife warden should be appointed from among the enthusiastic villagers who will look after the langurs.

If sufficient protection is given to the habitat and the animals, the dwindling Common Langur population may build up in the near future.

Phayre's Leaf Monkey *Presbytis phayrei Blyth*

The Phayre's Leaf Monkey or Langur occurs in



am-assamese macaque
cl-common langur, cpl-capped langur
dlm-dusky leaf monkey(?), hg-hoolock gibbon
lm-longtailed macaque, plm-phayre's leaf monkey
pm-pigtail macaque, rm-rhesus macaque
sl slow loris, sm-stumptail macaque

Map-1. Distribution of non-human primates in Bangladesh.

the high forests of Sylhet and in the gallery or patchy forests present in the tea estates. It has also been reported from Comilla and Chittagong, but it no longer occurs at Comilla, although a few troops still survive in the adjoining forests of the Chittagong Forest Division bordering the Comilla forests.

Capped Langur *Presbytis pileatus Blyth*

It is the commonest of all the species of langurs or leaf monkeys occurring in Bangladesh and stands next to Rhesus Macaque in order of relative abundance. It was met most frequently at Madhupur Forest Tract, in the moist–deciduous forests of Jamalpur and Mymensingh districts, and in the forests of Sylhet, Chittagong, Chittagong Hill Tracts (North & South) and Cox's Bazar Divisions. Neither the author nor other earlier workers have seen this langur west of Jamuna (Brahmaputra) and Padma (Ganges) and south of the Ganges rivers.

Unlike the Common Langur, it does not live in the human habitations, nor does it prefer open woodlands; but it may visit human habitations when these are present within the forests.

Hoolock Gibbon *Hylobates hoolock Harlan*

Earlier authors like Prater (1971) and Green (1978) have reported them from Sylhet, Chittagong and the Chittagong Hill Tracts (South) Divisions. This author has sighted them, in addition to the above divisions, at Cox's Bazar and Chittagong Hill Tracts (North) Divisions and received authentic reports of its occurrence at Balichari Range under Mymensingh Forest Division. The forest of this last division is a moist–deciduous type with Sal *(Shorea robusta)* and Bahera *(Terminalia bellerica)* dominating, whereas the forests of the other divisions are of evergreen or semi–evergreen type with *Dipterocarpus, Artocarpus, Syzygium, Trewia, Hopea, Swintonia,* etc., as dominants. Therefore its occurrence at Balichari is unique from the point of view of habitat composition.

Dusky Leaf Monkey *Presbytis obscurus* .

Mountfort (1968) has reported this primate from Sylhet. Neither this author nor other workers have sighted it there.

Conclusion

It is interesting to note that out of some 17 species of non–Human primates occurring in the Indian Sub–continent (including Nepal, Pakistan, Bhutan and Sri Lanka), Bangladesh has about 65% or 11 species of them within her jurisdiction. The remaining six species are endemic to certain regions, hence their absence from Bangladesh is explained. So far as species abundance is concerned, Bangladesh is potentially a rich country. But before going for commercial exploitation, in the form of export, density estimates of the commonest species must be made by competent authorities. With the exceptions of the Common Langur and Rhesus Macaque, no other primate occurs west of the Brahmaputra–Meghna rivers. The Common Langur of Jessore–Kushtia represents the easternmost boundary for the species and it is clear that Bangladesh does not support a viable population. By and large, all primates of this country prefer to live in the forests except for the Common Langur. The commonest, the Rhesus Macaque, is also a forest dweller although certain troops are found in the human habitations.

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ELEPHANT MIGRATION IN KAZIRANGA

by M.K. Sinha

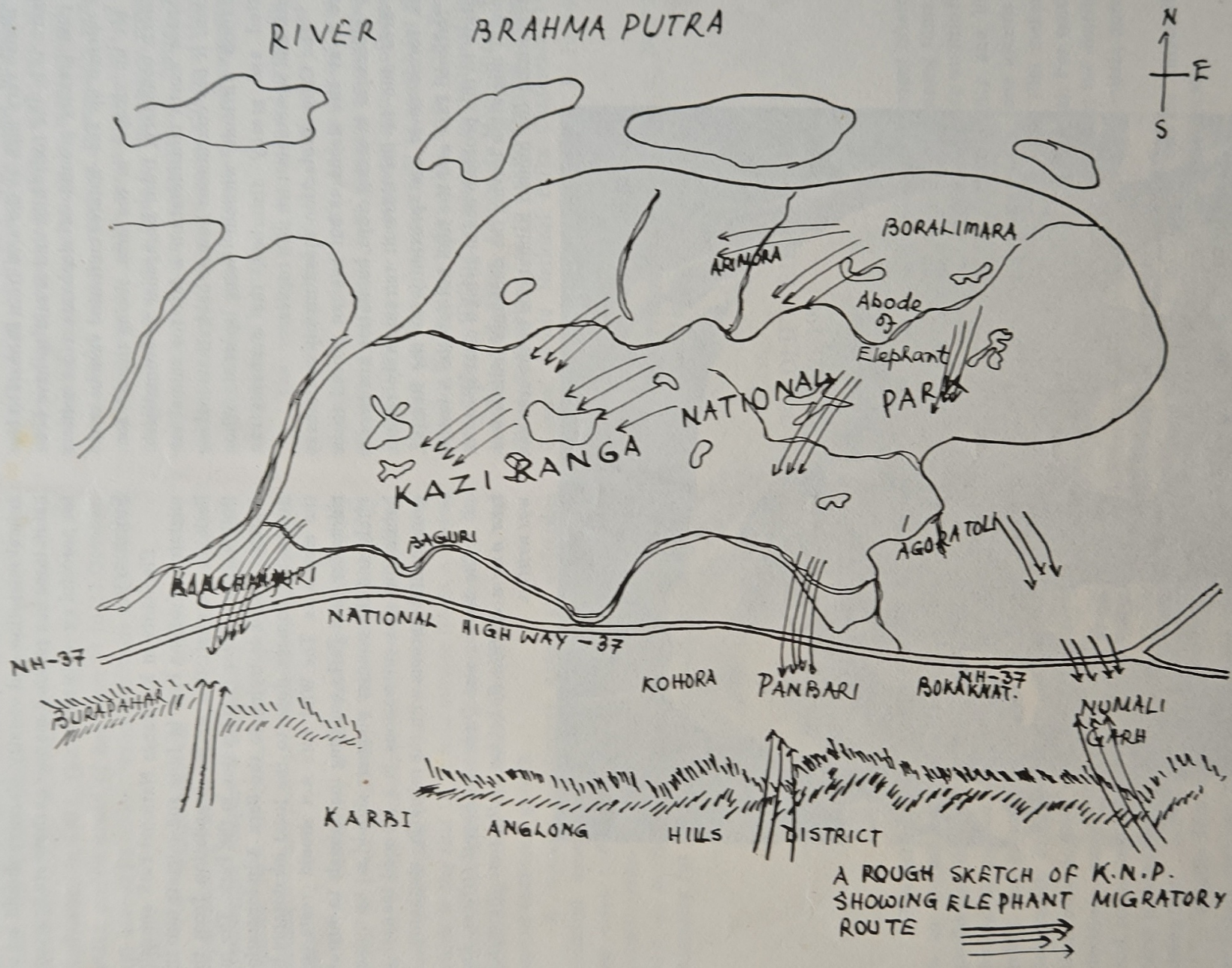
Migration of elephants *(Elephas maximus)* in the Kaziranga National Park is an annual event. Elephants migrate out of the Park during June and migrate into the park during October. Barring a few, of the 1,150 elephants reported in 1980 status census, almost all desert the National Park in the process.

In the Park, migration begins with the advent of the monsoon. Elephants move leisurely from North and North–East to South, South–West and South–East during April and May. During this period, large herds of elephants are sighted frequently near the Southern border of the Park and this must be a preparatory concentration for migration. In the Park, migration is generally completed by the end of May. Migration can be delayed or hastened depending on the occurrence of flooding, but it is never delayed beyond June. The North and North–East regions of the Park are higher than the South and the Forests are predominately composed of evergreen species and cane brakes. Thus, the elephants prefer to stay in those areas during the non–migratory period. Elephant migration into the Park begins in Mid–September and is completed by October.

The 425 Sq.km. Park is mostly low–lying and marshy, dotted with large and small lakes, cut up at places with small rivers and streams. The mighty River Brahmaputra flows in the North–East, North and North–West of the Park, stretching 10–15 kms. at places. The whole of the Park was once in the Brahmaputra bed, Even today, as soon as the Brahmaputra is in spate, the Park goes under the Brahmaputra flood water and remains submerged till the flood water recedes. The flood level in some years rises as high as 6 m. in the Park, turning Kaziranga National Park into a vast sheet of water. In some years the Park remains under water for 3–5 months, either continuously or at intervals. Most of the herbivorous animals face great hardships from a shortage of fodder and shelter. Animals are forced to migrate out of the Park in search of food and shelter and have to remain outside the Park until normal conditions return in the Park. As the flood in the River Brahmaputra has become an annual phenomenon, the migration of animals in Kaziranga has also become an annual process.

Reasons for the elephants and other animals migration towards the South, are: 1) The high lands of the Karbi–Anglong Hill Districts are very near to the Park, at places just bordering it; 2) Continuous and uninterrupted hilly terrain for grazing extending up to N.C. Hills, Meghalaya and Nagaland; 3) Assured food and some–what peaceful shelter; 4) Ideal breeding ground; 5) Impassable, turbulent stretch of the Brahmaputra river in the North; 6) Thick population in the North; 7) Distant hilly, terrain of Arunachal Pradesh in the North. Elephants have selected three routes of migration in the South: Kanchanjuri, Panbari and Numaligarh. They are adjacent to hilly, forested terrain, away from human habitation, or are sparsely populated. Other places have thick barriers of villages, Tea–Estates, townships or Bazars. Elephants generally move in migration between 2100 hrs to 0300 hrs when the routes are least disturbed.

The migratory period is a very trying one for the Park Administration. The responsibility of protecting crops, human habitations and human lives around the Park, rests with the Park Authority. As the migratory periods coincide with paddy cultivations, the elephants leave a trail of damage to crops and habitations along their migratory routes. Human beings have even been killed by elephants. As a protective measure the Park Authority has night patrols all along the 82 Km. border by its guards and watchers, on foot, on elephant–back and by vehicle. But total safety is far from assured. As a result, the public, politicians and the Civil Administration have put tremendous pressure on the Park Administration. Past records reveal, 3–4 losses of life each year and damage to crops and habitation worth 20–25 thousand Rupees. All elephants do not cause damage. Large herds (consisting of 30 and above and sometimes up to 100–200 elephants are seen in a herd) seldom cause any damage. They go deep inside the hills in their migratory sojourn. Small herds do cause some damage. But solitary elephants, or a maximum of two or three elephants comprising a herd, can become dangerous and can cause extensive damage. The solitary bull, when it becomes a rogue, has been known to demolish houses and kill human beings. Such elephants once having acquired the habit of killing human beings, tasting salt from kitchens, eating paddy from a godown and drinking home–made rice beer, develop a great taste for these activities and become the hard–core rogues, claiming lives, causing extensive damage and creating panic. Such rogues become incorrigible and unafraid of blank fire, torch



A ROUGH SKETCH OF K.N.P. SHOWING ELEPHANT MIGRATORY ROUTE

light, exposed flames and drum and can beating. Perhaps this is because they become used to such scare tactics.

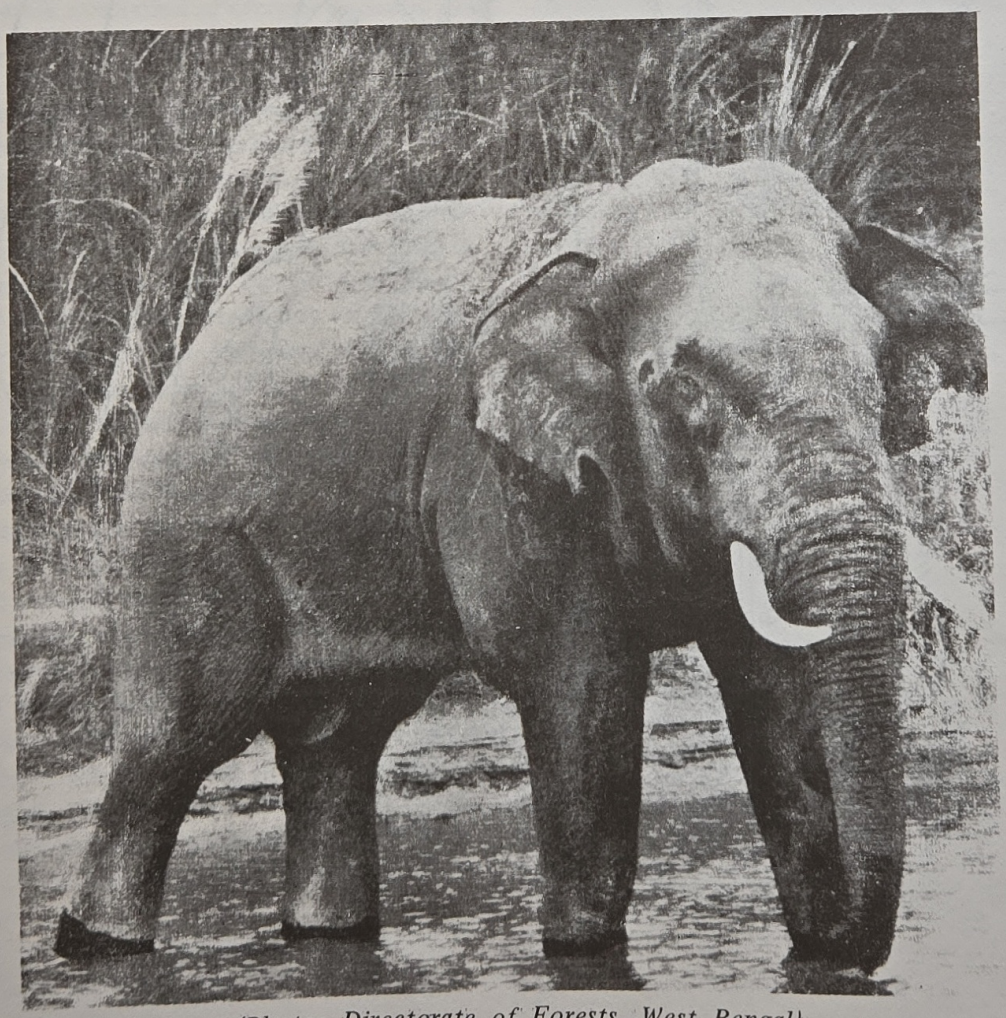
Such destructive activity can extend over an area as large as 80 Sq.Km. The intensity of depredation is also very high as the area from Panbari to Numaligarh is in the foot–hills and is said to have been the past grazing ground of elephants. Now settlers have opened up Tea–Estates,cultivated various crops and set up villages in the area. Along the 82 Km. southern boundary, from Burapahar to Numaligarh, no space worth consideration is left for animal migration. It has continuous human habitations making migration difficult without being spotted. When spotted and greatly disturbed, the elephants run amuck and sometimes turn into rogues.

The Crop–Protection squad mainly operates to scare away the elephants but has not proved to be very successful in saving crops, habitation and lives in the area due to the difficult terrain, hilly region, thick forest cover and proximity to the Reserve, the National Park and the high hill forests. A lasting solution to this problem lies in giving a clear space for elephant migration leaving the elephants undisturbed, systematising the human habitations in the area and the removal of artificial barriers in the migratory path. Above all, electrification of the houses and premises of the localities where elephant depredations are very common is necessary. The Wild Life Act should provide corridors around such Parks and Sanctuaries for animal migration and country planners should set up habitations in a planned manner as these are necessary for peaceful co–existence.

Summary:

Elephants in Kaziranga National Park annually migrate out of the Park in June and migrate into the Park in October, due to the inundation from the Brahmaputra River flood water in the Park. The migratory period is trying to the Park Administration due to the damage done to the local inhabitants by the elephants. The Wild Life Act should create corridors for such Parks enabling the animals to migrate safely and the country planners should set up human habitations and cultivations in a planned manner to avoid confrontations with the migrating elephants.

The author was Divisional Forest Officer, Eastern Assam Wilflife Bokakhat at the time the article was written.



(Photo: Directorate of Forests, West Bengal)

WORLD NATIONAL PARKS CONFERENCE 1982 TO BE HELD IN BALI

The Indonesia Government recently announced that it has accepted the invitation of the International Union for Conservation of Nature and Natural Resources (IUCN) to host the World National Parks Conference in 1982. The meeting, to be held on the fabled garden island of Bali from 11 to 22 October, will have as its theme, "Protected Areas in a Changing World".

The Conference will be organized by the Department of Forestry with IUCN as a co–sponsor. Considerable support is expected from several UN agencies, national conservation agencies, bilateral organizations and non–governmental sources such as WWF.

The conference is the third in a series which began in 1962 in Seattle; it was followed in 1972 by the second conference in Yellowstone National Park. Continuing this 10 year cycle, the Bali meeting which is the first to be held outside North America, indicates recognition of the growing emphasis of the developing world on nature conservation as a vital part of economic growth.

A working conference aimed at addressing practical issues of growing relevance, particularly the ways and means of integrating protection of natural areas with economic development, it is seen as providing working guidelines to land use managers for meeting the needs of people in their living environment.

Regional reports on the status of protected areas in each of the world's eight biogeographic realms will be presented, along with case studies illustrating practical solutions to management problems. Field trips to some of Indonesia's national parks and reserves which are integral parts of the meeting, will provide a basis for discussions covering such topics as marine conservation, buffer zone development, positive and negative effects of tourism, conservation of genetic resources, and conservation of the cultural heritage.

The meeting will be attended primarily by professionals involved in the development and management of national parks and protected areas in all parts of the world, with emphasis on countries actively developing new or expanded systems of reserves. Support for travel expenses will be sought for those in need. For further information, write to the Executive Officer, IUCN Commission on National Parks and Protected Areas, Avenue du Mont–Blanc, 1196 Gland, Switzerland, or to Lukito Daryadi, Secretary General, World National Parks Conference 1982, Directorate of Nature Conservation, Jl. Juanda 9, Bogor, Indonesia.

from **Conservation Indonesia**, *Vol. 4: No. 3–4, June/August 1980*

THE INTERNATIONAL WILDLIFE FILM FESTIVAL APRIL 10–12, 1981

The International Wildlife Film Festival (IWFF) is an annual event established to encourage the production of better quality wildlife films, to improve biological and educational content, and to further relate the natural sciences to human cultural development. Professionals are challenged now, more than ever, to help educate the public in order that decisions concerning wildlife can be based on wise and sound management. Films, with their quick and clear presentation of facts, are an excellent means of doing this.

Wildlife film entries are solicited from federal and state agencies, private organizations, universities, and individuals. Winning films receive awards based on artistic quality, art form, intellectual/scientific treatments, content, message, and the highest total quality.

The Festival Committee encourages interested individuals to consider the IWFF winning films first if they are thinking of buying or renting wildlife films. This will ensure for you top quality and highly accurate presentations. Hopefully, our awards and your purchase will encourage other film makers to strive for the goals set by the Festival. For rental or purchasing information, please contact the distributor or producer listed. The Festival Committee does not have these films on hand.

For more information on the International Wildlife Film Festival, please write or call:

Wildlife Film Festival
Wildlife Biology Program
University of Montana
Missoula, Montana 59812
(406) 234–5272

THE ASIAN RHINOS ARE ALSO UNDER THREAT

All three Asian species of rhino are endangered. Nowhere is there a large *continuous* population. This fragmentation puts surviving populations at greater risk—both from man—made disturbance and from the heightened chance of genetic degeneration and failing reproduction.

Sumatran rhinoceros — *Dicerorhinus sumatrensis*
Population: under 300

The Sumatran rhino is a forest dweller adapted to mountainous areas. For intrinsic behavioural reasons it has the lowest population density of any rhino — one per 4000 hectares. Habitat protection must therefore be scaled accordingly.

In Peninsular Malaysia a few Sumatran rhinos still exist in Taman Negara National Park, in Sungei Dusun game reserve and in Endau Rompin a proposed national park. Deforestation has so reduced numbers that in some cases there may no longer be a viable breeding population. A core area of Endau Rompin, previously part of the rhino range, was logged in 1977/78. A census in March 1979 found that rhinos now avoided this area—and there were no signs of breeding. In Sabah (Borneo) rhino tracks have been reported and a survey is needed.

In Thailand expanding human population, armed poachers, political unrest and trade in rhino parts have combined to reduce the Sumatran rhino population to perhaps no more than 10 animals scattered throughout five different regions. Only immediate and intensive conservation measures can hope to avert extinction.

In Sumatra (Indonesia) the Gunung Leuser complex of reserves is known to have a viable rhino population. Kerinci—Seblat, a forest area of about 1,000,000 hectares in central Sumatra, might be of similar importance. A survey here is urgent.

Javan rhinoceros — *Rhinoceros sondaicus*
Population: c. 50

The Javan rhino is better adapted to the forested plains and hills than to the higher mountain ranges. For this reason it has everywhere been wiped out except in Ujong Kulon nature reserve, a semi—island on the western tip of Java. Here under close protection backed by IUCN/WWF, the species has during the last 10 years doubled in numbers—to about 50.

But survival based upon a single population is precarious. Once rhino numbers have become too large for this reserve, a breeding nucleus should be transferred to a second area — preferably in Sumatra.

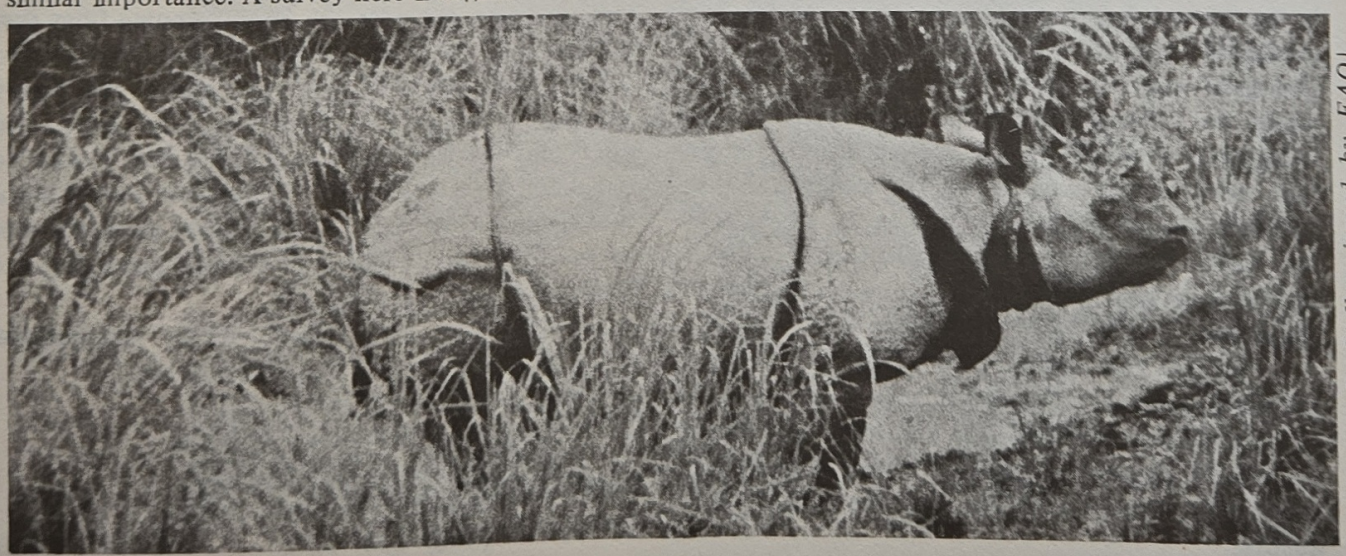
Great Indian rhinoceros — *Rhinoceros unicornis*
Population: 1100—1500

The Great Indian rhinoceros lives in fairly open country in India and Nepal. Confined to two largish populations and five smaller ones, local overcrowding is sometimes a problem as habitat is eroded by increased seasonal flooding caused by deforestation at higher altitudes. Kaziranga National Park is a case in point. A pilot translocation project could here help to relieve overcrowding.

Other dangers to these populations include contact with domestic buffaloes (bringing heightened risk of epidemics) and the loss of food supplies through the spread of two exotic plants, *Eichornia crassipes* and *Mikania scandens*. There is also a problem of poaching. Indian rhino horn is more highly prized than African because it is rarer. In early 1978 Bengal wholesalers were paying $875 a kilo.

This brief account of the status of Asian rhinos is largely based upon the August 1979 report of the Asian Rhino Specialist Group. The report was prepared by Professor R. Schenkel and Dr. L. Schenkel.

from **IUCN Bulletin** *Jan./Feb. 1980*



(Photo: R. Waller, issued by FAO)

ECOLOGICAL ASPECTS OF HABITAT PREFERENCES, FEEDING, DAILY ACTIVITIES AND NICHE OF THE NILGAI *(Boselaphus tragocamelus)*

by Indra Kumar Sharma

The Nilgai *(Boselaphus tragocamelus)* is the largest antelope of India and enjoys immunity against molestation by Hindus, who consider it as a wild cow (the cow is a sacred animal for Hindus). Although it is a serious pest to agricultural crops, it is an animal of much biological as well as economic importance. Ecological aspects of the nilgai have been little studied. I studied the ecological aspects of habitat preferences, feeding, daily activities and niche of the nilgai in Jodhpur district of the Indian Thar desert from February 1976 to October 1979.

Materials and Methods

Survey of habitats of the nilgai was performed in the Jodhpur district and its three typical biotopes were selected to study feeding habits, daily activities and niche with reference to different environments. Binoculars (7 X 50) were often used to observe the natural activities of the nilgai from a distance without disturbing them by a close approach.

Habitat Preferences

It was observed that the nilgai occurs at scrubby, gravelly plateau and scrub at gravelly foothill, and not at sandy scrub and other biotopes at all. Low–hill scrub seems to be an essential (common)factor for habitat of the nilgai. Agricultural farms are also favourable for high populations of nilgai. At Kankani which has a large number of farms and denser vegetation at the banks of the Luni river, nilgai are widely spread around the basin of the river.

The population was observed to be mainly concentrated at somewhat wastelands surrounded by or in the vicinity of farms. The nilgai invades farms from there and upon being frightened off by farmers, it retreats to the wasteland but soon returns to invade the farms again.

Its habitat was found to be dominated by large shrubs (or small trees) of *Euphorbia caducifolia, Salvadora* spp.,*Acacia senegal* and *Prosopis juliflora.* It was also noted that the nilgai prefers to live close to rain pools, particularly in the drought season.

Feeding Habits

The nilgai was observed largely living on *Desmostachya bipinnata, Cenchrus* spp., *Cynodon dactylon,* and other grasses, green grasses being preferred. Leaves and sprouts of*Zizyphus nummularia* and *Crotalaria burhia* are relished by it but leaves and stems of *Acacia senegal, Clerodendrum phlomidis* and *Indigofera oblogifolia* are also considerably taken by the nilgai.

In the drought season it was observed taking almost all vegetation available at the habitat, even

Capparis and *Salvadora* which are not palatable at other times.

Pestilence

The nilgai is a serious pest to agricultural crops. It heavily damages crops of wheat *(Triticum sp.)*, Sorghum *(Sorghum vulgare)*, Guar *(Cymopsis tetragonoloba)*, Mung *(Phaseolus mungo)* and Mustard *(Brassica campestris)* to name a few. It generally invades farms late at night and it has been noted that the nilgai can jump over a 2.5 meter high fence.

Herd Sizes

Mode herd sizes were observed to consist of 1 or 2 bulls, 3 cows and 2 young; or 2–3 bulls with 5 cows and 3 calves at favourable areas such as around agricultural farms. Several herds may assemble and herd size may grow to 5 bulls with 12 cows and 8 calves. 1 or 2 solitary bulls were often observed wandering aloof. Herd sizes and sex ratios were observed to fluctuate often by interactions of several herds in a wide habitat.

Activities cycle

The nilgai is solitary in habit and largely dirunal. In the summer, it was observed grazing early from dawn to 2–3 hours after the sunrise and then moving under the shade. of trees and bushes, resting and ruminating there until 2 hours before sunset. Thereafter it again grazes until about one hour after sunset, and then rests and sleeps for most of the night except on the occasions when it invades the farms.

In the winter, activities were observed throughout most of the day except for the period between one hour before noon to three hours after, when the day became very hot. In the rainy season, the nilgai were observed ranging wide, up to seven kilometers from their usual haunts, in search of better grazing fields.

Breeding

Litters of the nilgai were observed throughout the year, but February–March and October–November were observed to be the optimum periods for breeding during the year. The litter size was observed to usually be a single calf. The litter is born in the surrounding of *Zizyphus, Capparis* or *Euphrobia* bushes to hide the young from predators. The wolf *(Canis lupus)* and the dog *(C. familiaris)* occasionally attack the calf but it is largely protected by the mother and other members of the herd, particularly the bull.

Predation and Mortality

There is no serious predator of the nilgai in the Indian desert. The wolf and the dog occasionally hunt its calves but never the adult nilgai. However, these animals frighten the nilgai away from their territories by barking and hot pursuit. The fleeing nilgai occasionally kicks the pursured and can seriously injure it.

As the nilgai is considered a religiously protected animal, it is not harmed by Hindu farmers, even though it is a serious pest to their crops. However, there have been reports from some areas of farmers who do shoot the nilgai when it causes damage.

Nilgai (Photo: Kuper)

THE PASOH FORESTRY RESEARCH CENTRE – KEPONG, MALAYSIA

by Tho Yow Pong

The Pasoh Forest Reserve has been the site for an intensive research programme from 1970 to 1974 into the ecology and dynamics of the Tropical Rainforest environment under the auspices of the International Biological Programme. During these years, many aspects of the lowland forest ecology have been looked into by numerous teams of international scientists particularly from Japan and the United Kingdom working in close collaboration with local scientists. Some of the research areas covered include, productivity studies, floristic surveys, soil and soil nutrient studies, hydrology, nutrient cycling, faunistic studies and other related ecological aspects. The results of many of these studies were presented in 1974 in a IBP synthesis meeting held in Kuala Lumpur and also in publications over the last few years. The information accrued from these studies have no doubt contributed tremendously to the current understanding of the tropical rainforest ecosystem.

With all the vast background information that has already been accumulated over the years, it is needless to say that the Pasoh Forest Reserve is now an extremely important field site for ecological studies on the Tropical Rainforest Ecosystem which has in recent years received considerable amount of attention on a world wide basis. In view of this, the Pasoh Forest Reserve is now being designated as an International Biosphere Reserve under the Man and Biosphere Programme sponsored by UNESCO. In fact, it was originally proposed that the area was to be managed under the MAB programme after the IBP had wound up its programme. However due to some unforseen difficulties in the implementation of the programme, this has not come about.

The Forest Department of Malaysia has always recognised the importance of the Pasoh Forest Reserve as a research base and its eventual contributions to the better understanding of the management of the tropical rain forest. Hence, in order to continue making the research facilities in this area available to the Department, as well as to both local and international scientists, the Forest Research Institute of the Department has now taken over this area as one of its research substations as from December 1977. This has come about with the collaboration of the State Forest Department of Negri Sembilan. This substation will now be known as the *Pasoh Forestry Research Centre* of the *Forest Research Institute* of Peninsular Malaysia.

The Pasoh Forest Reserve

The Pasoh Forest Reserve is a 5000 acre reserve situated near the small village of Simpang Pertang in Negri Sembilan and is about a 2½ hour drive by car from Kuala Lumpur. The major part of the reserve is under lowland dipterocarp forest whilst towards its easterly boundary, the terrain rises at about 2000 ft and the forest here is represented by a stand of beautiful hill dipterocarp forest. Much of the core area within the reserve is still untouched by man but the surrounding areas have been logged in the past providing many examples of regenerating lowland forest. Even so, the reserve on the whole does provide a good representation of the Tropical Rain Forest ecosystem in Malaysia.

Floristically, the forest here is rich in the dipterocarps especially in *Shorea spp.* and *Dipterocarpus spp.* two very important groups of economic timber trees. It has also been established that within a 24 acre sample area almost 600 different species of trees over 1 ft. girth can be found. This is indeed a testimony to the heterogenity that exists within this forest and to the tropical rainforest on the whole. Faunistically the forest may be lacking in some of the bigger game animals like elephants, tapirs and tigers. However, a good composition of the smaller mammals, primates, and birds has been recorded.

Facilities at the Centre

In addition to the vast amount of background information that is already available of the Pasoh Forest, there are within the forest many established permanent plots laid out where studies such as phenology of trees, growth rates of trees, and seedling regeneration studies are being continously monitored. These plots are all established within the core area of the reserve and an extensive network of footpaths make these extremely accessible. In one plot, a tower, built around a *Shorea leprosula* tree, reaches right up to the canopy of the forest to facilitate observations at all levels.

Physical facilities in the centre have been improved considerably and it is now possible for research scientists to bunk in comfortably at the centre itself. A small laboratory is also available to research workers. At the Centre, there is now a resident Station Manager and a Research Officer, who are assisted by a labour force of seven people. The centre, where the buildings are, is easily accessible by car.

The Research Emphasis at the Centre

The tropical rain forest is an extremely important and vital resource to the country. However, due to its rapid exploitation, it is now a fast dwindling resource. The Forest Department of Malaysia is therefore extremely concerned over its proper management. As proper management can only come about with a sound knowledge of the ecosystem and how it generally works, the research emphasis at the Pasoh Forestry Research Centre has been geared towards the better understanding of some of the basic biological and ecological aspects of the economic forest trees in relation to the forest environment. It is hoped that this will provide some clues and answers for developing appropriate management systems of our forests.

The projects now being undertaken by the Forest Research Institute at the Centre include studies on the phenology of trees, studies into regeneration and mortality factors of forest tree seedlings, insects and their relationship to the reproductive biology of trees, plant succession studies, termites and their role in decomposition, and small mammal and bird population dynamics.

The Institute does however recognise the fact that there are many more facets of the ecology of the forest which are still largely unexplored and that this cannot be undertaken by the Institute alone with its limited expertise and manpower, coupled with its rather applied research priorities. Hence, we welcome active participation from other institutes and both local and international scientists. In this respect, a start has been made, as, there is a joint programme of research into the reproductive biology of timber trees by the University of Malaya and University of Aberdeen based at the Centre itself. In addition, the Geography Department of the National University of Malaysia has already drawn up research proposals for the study of the micrometeorology and hygrometeorology of this forest. It is hoped that with concerted efforts and active participation by all those interested in the ecology of the Lowland Rain Forest Ecosystem, the Pasoh Forestry Research Centre will remain as an internationally important field study area.

Pasoh Forest Reserve as an Educational Centre

Efforts have already been made to convert part of the forest here at the Centre for educational purposes catering to school children, University students and the general public. This will provide a chance for the Forest Department to educate the general public on both forestry and the ecological aspects of our Forests and to bring public awareness to this rich natural resource that we in Malaysia are so fortunate to be endowed with. Plans are also in store to convert another part of the Forest into an aboretum. In this way, the Institute hopes to bring the people into the forest, and, through the actual process of showing them what is on the ground, demonstrate that the forest is not just a stand of trees but a matrix of many biological systems knit into a dynamic & pulsating ecosystem. It is hoped therefore that schools, universities and public groups will make use of the facilities at the centre to take in the real essence of what the Tropical rainforest represents.

The author is Research Coordinator at: Pasoh Forestry Research Centre, Forest Research Institute, Kepong, Selangor, Malaysia.

LEATHERBACK TURTLES RETURN TO SUKAMADE BEACH

by Raleigh A. Blouch, Totok Sinaga and Pudji Sumarto

Between June and August, 1980, sixteen nests of leatherback turtles *(Dermochelys coriacea)* have been counted at Sukamade Beach in East Java, Indonesia. This is the first time in the past four years that this species of sea turtle has been recorded nesting here.

Sukamade Beach is located on the Indian Ocean within the Meru Betiri Wildlife Reserve, and is under the administration of the Indonesian Directorate of Nature Conservation (PPA). Conservationists regard it it as the most important sea turtle nesting beach remaining on the island of Java, and all turtles and

their eggs have been strictly protected here for the past two years. It is attracting growing numbers of foreign and domestic tourists who, when accompanied by PPA guards, are allowed onto the beach to view nesting turtles.

Four of the seven species of sea turtles in the world are known to nest at Sukamade. The green turtle *(Chelonia mydas)* is by far the most abundant, averaging about 100 nests per month. Much less frequently encountered are the hawksbill *(Eretmochelys imbricata)*, the Pacific Ridley *(Lepidochelys olivacea)*, and the leatherback. The loggerhead *(Caretta caretta)* may well occur here also, but this has yet to be confirmed. These are all classified as rare or endangered species by IUCN, and the leatherback is fully protected under Indonesian law.

Leatherbacks are strikingly different from all other species of sea turtle. For one thing, they are by far the largest. One measured at Sukamade had a total length of 215 cm and a width of 90 cm; the tracks they leave on the beach are over two meters wide; and their eggs approach the size of tennis balls. In addition, while all other sea turtles have hard, bony shells covered with plate–like scales, the carapace of the leatherback is soft and scaleless, as its name implies. It is furrowed with distinctive longitudinal ridges, and tapers posteriorly to an elongated point.

A sea turtle coming ashore to nest at night is an impressive sight. The female drags herself out of the surf and up the beach where she uses her hind flippers to excavate a hole in the sand above the high tide mark. At Sukamade this is about 80 cm deep for a leatherback, and some 10 cm shallower for other sea turtles. When she has finished depositing up to 100 or more eggs in the hole she proceeds to cover over the nest and conceal its location by plowing up the surface of the surrounding beach. Following a short rest she slowly crawls back to the sea, leaving the eggs to their fate. A sea turtle will usually return to the same beach to nest several times in a season, therefore the number of nests found does not correspond to the number of females nesting.

Turtle eggs are extremely vulnerable to predation by man, and they have long been over–exploited, causing sea turtles to be eliminated from many former nesting beaches. Leatherback eggs are particularly sought after because of their large size.

At Sukamade the first few leatherback nests have begun to hatch with an average incubation period of 66 days. Previous studies elsewhere in the world have shown that the hatching success rate for leatherback nests is generally lower than that for other sea turtles. This is proving to be the case here as well where, although a nest may contain up to 130 eggs, initial results indicate that only about 25% of these hatch successfully, the remainder being either infertile or dying in the embryo stage. As is also common for the species, Sukamade leatherbacks will often lay their eggs too low on the beach where they can be covered by the sea at high tide. In these cases PPA guards move the nests to safe sites higher up the slope of the beach.

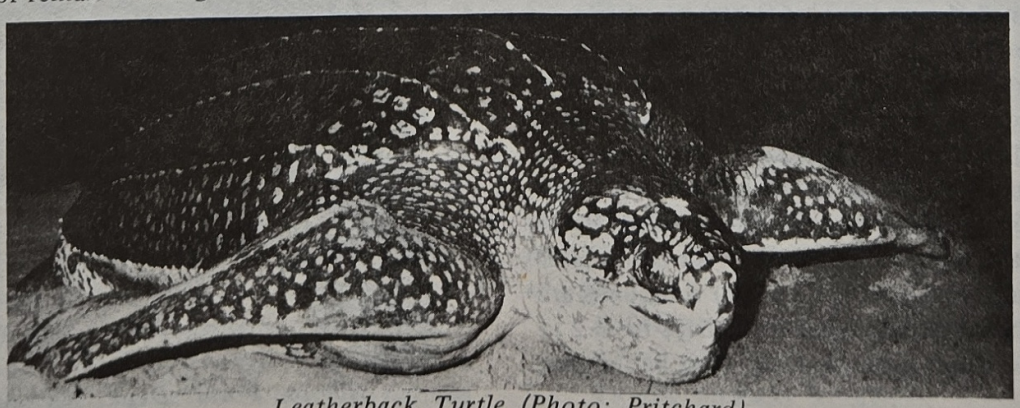
It is not understood why leatherbacks were absent from Sukamade for four years, nor is it known where they go when they leave the nesting beach. Realizing that research is needed to attempt to answer these and other questions concerning the Sukamade sea turtles, the World Wildlife Fund provided funds earlier this year for a tagging project carried out by a student from Padjadjaran University, Bandung. With support from PPA, a student from Brawijaya University, Malang, is currently studying growth rates of green turtle hatchlings. Such research coupled with continued strict protection of Sukamade Beach are important steps toward ensuring that the leatherback turtle and its cousins do not disappear forever from Javan waters.

About the authors:

a) Raleigh A. Blouch––Leader, World Wildlife Fund Meru Betiri Project;

b) Totok Sinaga––Graduate student, Department of Fisheries, Brawijaya University, Malang;

c) Pudji Sumarto––Counterpart biologist, WWF/PPA Meru Betiri.



Leatherback Turtle (Photo: Pritchard)

PRELIMINARY SURVEY OF THE PROBOSCIS MONKEY AT TANJUNG PUTING RESERVE KALIMANTAN

by Bismark

A survey of the proboscis monkey *(Nasalis larvatus)* was done along portions of the Sekonyer river system within and bordering the Tanjung Puting reserve in south Kalimantan Indonesia. Observations were made twice each day, once each in the morning (0530 to 1100) and afternoon (1600 to 1830) from June 30 to July 11, 1979.

The morning samples taken along the right Sekonyer, which is about 12 km. long and entirely within the reserve, gave counts ranging from 30 to 117 individuals (mean 73.8). An afternoon sample taken for this section of the river gave a count of 70. Along the left Sekonyer, which forms one boundary of the reserve, 106 individuals were observed on about 5 km. of the river during a single afternoon sample. A morning survey (0700 to 0900) of about 6 km. down the main Sekonyer river from the junction of the tributaries (a section also forming part of the reserve boundary), gave a count of 145 individuals.

During the morning and afternoon samples it was observed that the proboscis monkeys' activities were primarily feeding, playing and resting. These activities were centered around the groups sleeping trees.

Proboscis monkeys typically choose the trees nearest the river bank to sleep in. The reason for this is not well known but could concern protection from predators, feeding patterns and/or thermal regulation. Another possibility is that communication between groups may be facilitated by returning to the river each afternoon (Gary Shapiro pers. commun. 1979). Observations indicate that the proboscis monkey prefers to sleep in the tallest trees in a localized area, usually *Ganua mottleyana* (58%) but also use lower trees, especially *Eugenia* spp. The trees chosen to sleep in are usually either food trees, like those mentioned above, or near food trees.

On the right Sekonyer the observed group size ranged from 19 to 22 (mean 20) whereas on the left Sekonyer and the main Sekonyer river, group size ranged from 19 to 42 individuals. The number of individuals in a group can be counted in the early morning (0600 to 0700) and the afternoon (1800 to 1900) when the group congregates at the river. Later in the morning (about 0800 to 0900) subgroups are observed at the river that range in the size from 2 to 14 individuals. These subgroups appear to be foraging units.

Based on the above observations, the population density of the proboscis monkey in the survey area is calculated to average 94 individuals/km^2. This possibly represents a maximum density for the species because the habitat at Tanjung Puting is suitable and little disturbed, and hunting activities are rare. The disturbance that does occur is usually along the left sekonyer and the main sekonyer portions of the river on the outside of the reserve. Most of the disturbance is in the form of individuals logging *Tetra meristra glabra,* which is also a source of food and used for sleeping trees by proboscis monkeys. Presently this low scale logging does not seem to be harming the proboscis monkey populations. But if the logging is intensified in the future, it could affect the balance of the peat swamp ecosystem causing the proboscis monkeys to cross over into the reserve where population density could increase until the carrying capacity is exceeded, so this possibility should be considered.

The proboscis monkey probably practices a polygamous mating system. This indicated by large group size (19 to 42 individuals) and a high adult male to adult female ratio (1 : 1.5).

The preceding survey was supported by the Wild Animal Project of the Research Institute Bogor, where the author works.

(Photo: Forest Dept., Sarawak)

IUCN/SSC ASIAN ELEPHANT GROUP

NEWS NO 6

Introduction

It is now over two years since we published our last **News** in **Tigerpaper** (5 (4): 31–33). In that time the fortunes of both our Asian Elephant Secretariat (which compiles these **News**) and **Tigerpaper** have waxed and waned, but currently both are re–established with more relevance than ever before, and long may this be so!

Space does not permit more than a brief resume of the activities of the IUCN/SSC Asian Elephant Specialist Group (AESG) and its members over the last, extremely active, two years. Some of the most noteworthy events are given below.

Group Composition

In line with a general policy decision of IUCN's Survival Service Commission regarding all its specialist groups, the AESG no longer operates under two Co–Chairmen. There is now a Chairman (Mr. J.C. Daniel) and a Deputy–Chairman (Dr. R.C.D. Olivier). Our group membership is small, but comprehensive in both geo–political and technical senses. Full membership details may be acquired from Mr. Daniel, Bombay Natural History Society, Hornbill House, Shahid Bhagat Singh Road, Bombay 400 023, India (Tel. Bombay 243869).

Action Plan

In our second News (**Tigerpaper** 5 (1): 20–24) we presented a very preliminary "Master Plan", as we called it then, for the Asian Elephant. With an improved country–by–country layout, this has now evolved into a most comprehensive "Action Plan" for the entire region. To avoid confusion it should be realised that the regional "Plan" is merely a compendium of individual country "Plans". These "Plans" are designed to be evolving documents, whose composition and components are to be continually revised and improved with new knowledge, better understanding, changes of perception and values, and it is hoped, as implementation of the Action Plan reduces some problems and allows a higher priority to be attached to others.

Although the first draft was produced in October 1978, it is not surprising therefore, to find that the Plans for most countries are now in their second or third drafts. In each of our ensuing News, starting with the next issue, we hope to publish the full updated Action Plans of one or more countries.

IUCN/WWF Asian Elephant Co–ordinating Centre (WWF/IUCN Project 1717)

A major new dimension to our activities since 1978 is that thanks to the fund–raising activities of World Wildlife Fund on behalf of elephants, we are now in a position not only to draw up Action Plans, but also to begin to *implement* them on a priority basis. To date over U.S. $1.1 million has been raised, and there is more on the way. WWF's British National Appeal, for example, has yet to complete its elephant fund–raising campaign. Approximately one third of total WWF elephant funds are earmarked for Asia, the balance for Africa.

In view of these and other important developments, IUCN/WWF decided to revamp and relocate their Asian Elephant Secretariat. Formerly this had been run on a part–time basis by then Group Co–Chairman Robert Olivier from his laboratory at Cambridge University in the U.K. The Secretariat is now re–named the Asian Elephant Co–ordinating Centre (AECC), and has retained the services of Dr. Olivier to run the AECC on a full–time basis in the capacity of a regional co–ordinator for IUCN/WWF's Elephant Survey and Conservation Programme in Asia.

On June 4th 1980, IUCN/WWF won the approval of the Cabinet of the Sri Lankan Government to establish the AECC in that country. The Centre is now located near Colombo and uses the following address:–

IUCN/WWF ASIAN ELEPHANT COORDINATING CENTRE,
16 DE SARAM ROAD,
MOUNT LAVINIA, SRI LANKA.

Telephone: Mount Lavinia (071) 5603
Telex: 21104 BOSWIT
Telegrams: ELEPHANTS, Mount Lavinia.

At the time of writing, the terms of reference for the AECC are yet to be finalised between IUCN, WWF and the Sri Lankan Government. However, they are presently drafted as given below – any significant changes will be notified in future News.

Terms of Reference

1. To facilitate the work of the IUCN/SSC Asian Elephant Specialist Group (AESG) and thereby provide better coordination to, and increase the efficiency of, IUCN/WWF efforts to conserve wild populations of Asian Elephants throughout the region.
2. To serve as an information clearing house and "international elephant conservation monitor". Due in large part to its links with organisations involved in elephant conservation world–wide, the AECC is available to advise or inform any organisation or individual interested in elephant conservation which wishes and can benefit from such advice or information.

The Asian Elephant Coordinating Centre will therefore:

– provide co–ordinating services mainly in the following spheres:–
  (a) within the AESG, particularly the Chairman's office in India.
  (b) between AESG and IUCN/SSC Gland.
  (c) between AESG and other SSC Specialist Groups.
  (d) between AESG and all other concerned organisations and individuals; international and local; governmental and non–governmental.

In this way the AECC will maintain and develop existing region–wide contacts in order to identify problems to be drawn to the attention of the AESG; to avoid duplication between organisations and individuals active or interested in elephant conservation in the region; and to monitor the impact of IUCN/WWF and other projects on the position of elephants in Asia and forward such information to the AESG.

– Help and assist, develop, and bring to successful implementation activities and projects compatible with IUCN/SSC/AESG policies for the conservation of the Asian Elephant. This help and assistance could be provided in *any way* requested by AESG members, contacts, Govt. and non–government organisations, *provided such help and assistance :*
  (a) is approved by AESG Chairman; AESG members/reps. in the country concerned; and SSC/XO and Steering Committee, and
  (b) would not disrupt or diminish the overall contribution and effectiveness of the AECC with regard to its established terms of reference.

Survival Service Commission line–up. Seated from left to right are Dr. R. Olivier (Deputy–Chairman, AESG), Mr. R. Fitter (Chairman, SSC Steering Committee), Dr. F. Wayne King (Deputy–Chairman, SSC), Sir Peter Scott (Chairman, SSC), Mr. R. Scott (Executive Officer, SSC), and Mr. J.C. Daniel (Chairman, AESG), (Photo: Janet Barber, WWF–U.K.)

- establish a collection of technical and educational resource materials (documents, reprints, photos, films, a/v programmes) and will undertake the duplication and redistribution of such materials on request. In this way the AECC could also serve as a central repository for records of information acquired by the AESG, and will undertake to circulate reports, proceedings etc. of AESG activities, meetings etc. as necessary. In particular the AECC would compile and circulate the AESG "Action Plan" for continuous review and assessment by the AESG and its consultants.
- advocate the conservation of Asian Elephants, and the raising of funds for such purposes, whenever appropriate opportunities arise and in this connection will also compile and distribute a regular "Newletter" (in Tigerpaper) of AESG activities and Asian Elephant conservation news. The AECC would also undertake "in–house" to lecture, broadcast, and publish articles, in both technical and popular media to advance the aims of IUCN/WWF/AESG/AECC as necessary and appropriate.

With the above Terms of Reference in mind, all readers of Tigerpaper and our News should feel free to correspond with the AECC on appropriate and relevant issues.

2nd Meeting of the AESG (WWF/IUCN Project 1919)

In our first News (Tigerpaper 4 (4): 22–25) we reported on the 1st Meeting of our Group which was held in Banglore on the 24th and 25th February 1977. In this our first of a "second" series of News, we report on one of the first undertakings of the AECC (see above) which was to organise the 2nd Meeting of the AESG.

This was held at the Sri Lanka Foundation Institute in Colombo on 20th and 21st August 1980. Specialists from India, Sri Lanka, Nepal, Bangladesh, Malaysia, Thailand, and Indonesia attended. Altogether there were some fifty participants and observers. The meeting was presided over by Mr. J.C. Daniel, Chairman of the Group. Mr. Sarath Amunugama, Secretary to the Ministry of State (which is responsible for wildlife in Sri Lanka) delivered the opening address.

The meeting obtained extensive coverage in the national and international press. Its main purpose was to recommend to WWF International what projects should be implemented where on a priority basis from available funds. To provide appropriate context to this endeavour, the meeting also received up–to–date reports on elephant status in the various countries represented. Other topics relevant to Asian Elephant conservation, such as the ivory trade, and schemes for preventing and compensating crop losses due to elephants, were also the subject of separate report and debate.

In discussions following the above, agreement was reached on the recommendations the Group would make regarding allocations in 1980/81 of the approximately U.S. $300,000 then available from WWF International for Asian Elephant conservation. These recommendations are currently being studied by IUCN/WWF.

It is our intention to focus in turn on one or more countries in each of our forthcoming News. As indicated earlier, this focus will present the latest country Action Plan (which includes the proposed projects in the list shown), and in addition will give a summary of the country report given at the meeting. As appropriate context arises, the other topics covered during our meeting will also be included in these News. In the meantime copies of the official proceedings of the meeting may be obtained from the AECC (address given in last section).

New Research Underway in Sri Lanka (WWF/IUCN Project 1783)

The Accelerated Mahaweli Development Scheme (AMDS) will transform the ranges of some of the most important of Sri Lanka's few remaining elephant populations, and in the process threatens to displace about 30% of the nation's total number of elephants. The establishment of a new National Park around two reservoirs to be created under the Scheme on the Maduru Oya and Ulhitiya Oya, is crucial to the survival of perhaps the most important contiguous elephant population within the AMDS. Elephants range continuously between the proposed Park area and two established reserves to the northwest (Wasgomuwa), and southeast (Gal Oya), and so the creation of "corridors" linking these areas is vital to the viability of all three. The entire northwestern border of the proposed Park is scheduled to come under agriculture (mostly sugarcane), and inadequate consideration of elephant requirements is sure to result in massive crop losses.

This project aims to acquire objective data on elephant requirements in the area through systematic reconnaissance surveying supported by radio–tracking and other techniques. Initially, when related to current development plans, this information will be used to recommend optimal boundaries for the reserves, and optimal alignment of their linking corridors. Ultimately it will also provide a sound

ecological basis to long–term management. In such ways crop damage may be minimised, and long–term conservation prospects maximised. The project was originated by the Director of the Government's Department of Wildlife Conservation, and is part of a larger national elephant conservation strategy drawn up by the Department. The principal investigator is Mr. N. Ishwaran, a lecturer in the Zoology Department, University of Peradeniya. Ishwaran holds an M.Sc. for an elephant ecology study made under the auspices of the Smithsonian Sri Lanka Elephant Ecology Programme which ran from 1967 to 1976. The University has given Mr. Ishwaran two years leave in which to undertake this project. We hope to publish extracts from his progress reports in due course.

Group Helps Make Film on Asian Elephant

The 2nd of July, 1980, saw the world's first screening on Britain's independent television network of Survival Anglia's new 50 minute documentary on the Asian Elephant entitled "The Last Roundup". Filmed by Dieter Plage and his assistant Ashish Chandola, "The Last Roundup" documents in its first half the last *khedda* operation to be authorised in Assam. The second half of the film concentrates on one of the most impressive Asian Elephant conservation efforts ever undertaken. This was the successful capture of 11 "pocketed" elephants in Sri Lanka, and their translocation by the Department of Wildlife Conservation in September/October 1979 to the security of the Wilpattu National Park. We plan to give a further report on this operation when we focus on Sri Lanka in a future News.

We have no hesitation in highly commending this film, not least because Anglia used our Group as scientific consultants in its preparation, but also for its compelling conservation message. A film such as this had been notable by its absence for all too many years, so we proffer our congratulations to Mr. Plage and Anglia for filling this gap so admirably. For Further information on "The Last Roundup" please contact Survival Anglia Ltd., Brook House, 113 Park Lane, London W. 1.

Publisher's Announcement

FELEPHENCE: A Manual for Construction of Electric Fencing against Elephants in the Humid Tropics, by Blair, J.A.S; Noor, N.M; Piesse, R.L; and Saharudin Anan.

Since 1977, the Department of Wildlife and National Parks in Peninsular Malaysia has been collaborating with the Federal Land Development Authority (FELDA) to restrain elephants from entering agricultural areas, particularly of tree crops such as oil palm and rubber. After initial experimentation with ditches, better results were obtained from the introduction of electric fencing. After two years of development, under the supervision of three of the authors of this manual, FELDA called in the short–term services of an Australian fencing consultant, Mr. R.L. Piesse, who had had twenty–five

Mr. N. Ishwaran, principal investigator of the new WWF/IUCN Project 1783 receives the keys to his Toyota jeep from Dr. R. Olivier (extreme right). Looking on are Prof. H. Crusz (extreme left), Head, Department of Zoology, University of Peradeniya, and next to him Mr. L. de Alwis, Director, Department of Wildlife Conservation. (Photo: Dept. of Information, Sri Lanka.)

years experience in fence construction. As a result of the experimentation in Malaysia, and cross–fertilisation of its findings with experience in Australia and elsewhere, a fence design has been introduced that provides a satisfactory answer to elephant exclusion from crop areas, even in the difficult conditions experienced in the wet tropics.

This manual assumes no prior knowledge on the part of the user and spells out step–by–step, with the aid of simple diagrams, how to go about constructing an elephant–proof electric fence to the FELDA design. Material requirements are detailed (with a column where metric conversions are indicated), and there is a complete guide to the necessary tools and where to obtain them. Relevant aspects of elephant behaviour are noted and techniques to challenge their intelligence described.

A complete manual for all currently suffering crop depredations by elephants.

Date of publication: October 1980. Format: Over 100 pages including diagrams and illustrations in –loose–leaf, protected page format. Published by: FELDA Institute of Land Development, Trolak, Perak, Malaysia. Language: English. Orders: Librarian, FELDA Institute of Land Development, P.O. Sungkai, Perak, Malaysia. Cost: US $45.00 *plus* Internal/Seamail $5.00; Airmail $12.00.

Note Both Mr. James Blair, who is a Colombo Plan Expert in Economic Planning and Evaluation attached to FELDA; and Mr. Saharudin Anan, who is Deputy Director (Elephant Unit), Department of Wildlife and National Parks, West Malaysia; attended our 2nd AESG Meeting held in Colombo, to which they presented separate papers.

FOOTNOTES

IUCN/SSC ASIAN ELEPHANT GROUP NEWS is edited by the Director of the IUCN/WWF Asian Elephant Coordinating Centre, 16 de Saram Road, Mount Lavinia, Sri Lanka. Opinions expressed in the newsletter are editorial opinions and should not be taken as the official view of WWF, IUCN, FAO or UNEP.

1980/81 Fund Allocations Recommended By the Second Meeting of the AESG

	1980	1981	Remarks
1. Asian Elephant Coordinating Centre	40	40	Appr.
2. 2nd Meeting AESG	6	–	Compl.
3. Bangladesh: elephant management Teknaf Peninsular	5	5	U/dev.
4. Burma: The importance of elephants in Burmese forestry	–	30	U/scr.
5. India: Office for Chairman AESG	3	15.5	U/dev.
6. India: Elephant habitat survey in the N.E. region	14	7.5	U/dev.
7. India: Elephant habitat survey in the central region	13	8	U/dev.
8. India: Studies in the Jawahar Park and elsewhere in the S. region	14.5	5	U/dev.
9. Indonesia: Conservation of endangered large mammals in Sumatra	–	25	Appr.
10. Nepal: Studies in proposed Chitwan extension	–	1.75	U/dev.
11. Sri Lanka: Establishment of Meduru Oya complex of reserves	8.5	–	Appr.
12. Sri Lanka: Camping equipment for Elephant Conservation Unit	8	–	U/dev.
13. Sri Lanka: Mobile Unit for education programme	14	–	U/scr.
14. Thailand: Elephant conservation in the Petchabun hills of north–central Thailand	–	30	U/scr.

KEY.
All figures are in thousands of U.S. $
Appr. = approved
U/dev. = under development
U/scr. = under screening
Compl. = completed

PUBLICATIONS

UNITED NATIONS LIST OF NATIONAL PARKS AND EQUIVALENT RESERVES

1980. Compiled by Harold K. Eidsvik. IUCN, Gland Switzerland. pp 121, US$7.50, plus postage.

The United Nations List of National Parks and Equivalent Reserves is compiled by the Commission on National Parks and Protected Areas (CNPPA), one of the six Commissions of the International Union for Conservation of Nature and Natural Resources (IUCN). The Commission was formerly called the International Commission on National Parks; its name was changed in 1975 to reflect the broader concept of protected areas.

The List includes national parks, nature reserves, biosphere reserves and World Heritage sites. The criteria for selection are explained in a section; in future editions of the List, reporting will be based on these criteria and their related categories.

The present List follows the format and is an updating of the 1975 edition based on comments received from governments and the review of consultants' reports prepared by IUCN.

In the List, the realm, the biogeographic province and biome have been added in line with the definitions provided by IUCN Occasional Paper No. 18, "A Classification of the Biogeographical Provinces of the World," 1975. Data to provide similar information for all areas in the List were not available. It is planned to extend this aspect of the List in future editions.

Only areas of 1,000 hectares or more have been included. Islands which are protected have been included generally without regard to size. Where such reserves were numerous they have not all been individually noted.

The List of National Parks is relatively complete but State or provincial parks have not been included in this edition because the data available were totally inadequate to provide a representative picture of the global situation. The List of Nature Reserves is of mixed quality because it has been difficult to determine to what extent many of these areas are multiple use forest management areas. The World Heritage List and the List of Biosphere Reserves are complete as of October 1979.

According to the compiler, all marine parks have not been specifically noted because of a lack of data at the time of printing. A revision of G. Carleton Ray's report on Marine National Parks (1976) was received in September 1979. The revision notes 302 existing marine reserves, 354 proposed reserves and 928 island and coastal terrestrial parks.

from **PARKS** *Vol 5, No 3 – Oct/Nov/Dec 1980*

THE INTERNATIONAL TRADE IN RHINOCEROS PRODUCTS

1980. By Esmond Bradley Martin. Published by IUCN. ISBN 2–88032–203–0.

This report caused quite a stir when it was first released earlier this year. Now IUCN has published it in an attractive booklet form.

Thanks to Dr. Bradley–Martin's report conservationists now have for the first time an accurate picture of who is buying rhino horn and what they are using it for. The outcome of research carried out in China, India, Hong Kong, Taiwan and North Yemen and several other Asian countries, the report has dispelled the long–held myth that Asians prize the horn as an aphrodisiac. Instead Dr. Bradley–Martin found that they use it mainly as a fever–reducing drug – a vital piece of knowledge that may lead to the provision of alternatives.

Just as important the Study reveals that there is a booming market for African rhino horn in North Yemen where it is used to make the handles of traditional daggers. Apparently Yeminis – returning with their savings from neighbouring Saudi Arabia– are prepared to pay top prices for the real thing. One reason why the wholesale price of rhino horn has rocketed twenty–fold over the past five years.

Dr. Bradley–Martin's findings have already prompted IUCN to take initiatives to protect the rhino. Since this report was released he has been continuing his studies and recently another report – this time on India – was made public.

from **IUCN Bulletin** *Nov/Dec 1980*

THE LAND SPEAKS: ORGANIZING AND RUNNING AN INTERPRETATION SYSTEM

1979. By Yorke Edwards. The National and Provincial Parks Association of Canada, Toronto. 87 pp. Canadian $5.00 includes postage.

In response to needs, the publisher of this booklet has issued occasional books and reports on matters of special importance to park and related

reserves. This booklet is in this series. It will be of special interest to park managers and administrators who are serious about the business of interpretation and how this often misunderstood term may apply to them and the protected properties in their charge.

The author is Director of the British Columbia Provincial Museum, and formerly served the Canadian Wildlife Service in Ottawa. He is well–known in the interpretation field, with some 20–years' experience across Canada and abroad. His special ability to cut through the fog that often enshrouds such subjects when treated by some others will delight the reader. He can be understood, as, clearly, he should be. "If everyone really understood grass," he says – reducing the matter to its simplest terms – "they would understand enough of the world to solve most of its man–caused problems." We all could say "aye" to that.

The book is organized in a straightforward way, dealing with the whats, whys and wherefores a manager should know about the subject.

An appendix by V.E.F. Solmon of the Canadian Wildlife Service, entitled "What Interpretation Should Be Like," concludes the book – an essay, or speech, perhaps, that in itself is worth the price of the booklet. – R.I. Standish

(The drawing of Canada geese in flight is one of the excellent division sheets used in the book)

from **PARKS** *Vol 5, No 3 – Oct/Nov/Dec 1980*

GUIDELINES FOR PROTECTED AREAS LEGISLATION

1980. By Barbara Lausche. Published by IUCN. ISBN 2–88032–086–0. IUCN Environmental Policy and Law Paper No. 16.

The anticipated readership for this paper, which sets out in one document the important and legal elements for legislation are the legal drafter and other participants in the legislative process who are reviewing, revising or creating protected areas legislation. Protected areas managers or planners may also find the guidelines useful in understanding and appreciating the legislative needs of their programmes. This paper is divided into two parts: a short preliminary section with background material on protected areas; and a main section containing the guidelines for legislation for protected areas especially those where the purpose is conservation, focusing on principal issues which should be examined and dealt with in any protected areas legal regime.

A vailable in English only at US$10.00 from IUCN's distributors, Bowker and Unipub.

from **IUCN Bulletin** *Nov/Dec 1980*

ADAPTIVE ENVIRONMENTAL ASS–ESSMENT AND MANAGEMENT

Edited by C.S. Holling, University of British Columbia.

This book, following a joint project by UNEP and the International Institute for Applied Systems Analysis, sweeps away some of the prevailing "myths" about the environment. For example, those which claim that ecosystems – complexes of plants and animals inter-acting with one another and with their immediate area – are universally fragile, and because everything in nature is connected to everything else, it is necessary to study all the aspects of the environment before one can evaluate the impact of a development project.

The book points out that current approaches to environmental concerns have been very much coloured by the "protective" and "largely reactive" attitude towards nature prevailing among some environmental circles in the industrialized world.

According to the book, in most development activities as soon as the environmental impact statement is stamped "approved", the bulldozers move in. Monitoring of the development activities during its implementation tends to get shoved into the background. A major change required to shift environmental assessment from its traditional role into meaningful environmental management is the continuation of assessment activities during and after the period of construction. Such an extension of activity requires the addition of a monitoring capability. Apart from assisting to mitigate environmental impacts, monitoring also provides useful pay off-lessons for the next time.

from **UNITERRA** *July 1979*

THE INDIAN SPOTTED DEER ($\frac{1}{15}$ nat. size).

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